AUSTRON, Inc.

a DATUM company

CRYSTAL OSCILLATORS

TIME CODE PRODUCTS

TIMING AND FREQUENCY EQUIPMENT & SYSTEMS

AUSTRON INC

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AUSTRON, Inc.

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"Pioneers In Precision Time and Frequency Products"

AUSTRON, Inc.

AUSTRON, Inc. is a leading manufacturer of instruments and systems for the precise measurement of time and frequency. Our products are used in communications, space and missile tracking, navigation and metrological applications.

AUSTRON has been engaged in time and frequency technology since our founding in 1962 and has steadily expanded our technology competence and capabilities while growing into a fully integrated manufacturer.

Our product lines include crystal oscillators, time and frequency equipment and time code products. With headquarters in Austin, Texas and a sales office in Reston, Virginia, **AUSTRON** products are marketed in some 25 countries throughout the world.

If you require further information concerning any of our product lines, please write or call:

AUSTRON, Inc.
P.O. Box 14766
Austin, Texas 78761-4766
Phone: (512) 251-2313
TELEX: (910) 874-1356
FAX: (512) 251-9685

AUSTRON PRODUCTS

OSCILLATORS

1100	Crystal Oscillator
1105	Crystal Oscillator
1111	Crystal Oscillator
1115	Crystal Oscillator
1120	Crystal Oscillator
1120FW	Crystal Oscillator
1150	Crystal Oscillator
1151	Crystal Oscillator

TIME AND FREQUENCY EQUIPMENT

1201B	Linear Phase Recorder
1210D	Portable Crystal Clock
1250A	Crystal Frequency Standard
1290A	Standby Power Supply
1294	Pulse Distribution Chassis
1295D	Distribution Chassis
1295D	Modules
2000C	Loran-C Receiver
2010B	Disciplined Frequency Standard
2021L	Loran-C Directional Antenna
2026W	Loran-C Vertical Antenna
2055A	Phase Microstepper
2100	Loran-C Timing Receiver
2100F	Loran-C Frequency Monitor
2100R	Loran-C Frequency Receiver
2110	Disciplined Frequency Standard
2112	Disciplined Rubidium Standard
2200	GPS Satellite Receiver
2201	GPS Satellite Receiver
2310	Disciplined Cesium Standard

TIME CODE INSTRUMENTS

5581	Gas Discharge Display
8100	Option Summary
8110	Time Code Digital Clock
8120	Time Code Generator
8132	Time Code Reader
8134	Time Code Reader/Tape Search and Control Unit
8152	Time Code Generator/Reader
8154	Time Code Generator/Reader/Tape Search and Control Unit
8155	Sychronized Time Code Generator
8181	Single Line Readout/Display
8190A	Pulse Distribution Amplifier
8526	Portable Time Code Generator
8720	Compact Time Code Generator
8730	Compact Time Code Reader
8781	Serial Remote Display

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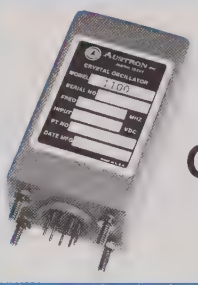
MODEL 1100



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1100 Crystal Oscillator combines high stability with low power drain in a small, light-weight, plug-in package. The Model 1100 features excellent short-term stability, low phase noise and aging as good as 1×10^{-9}/24 hours. This hermetically sealed crystal oscillator finds application whenever space is at a premium and performance cannot be compromised. The Model 1100 employs a precision, third-overtone crystal mounted in a high-gain DC proportional oven. The output level is one volt rms across a 50-ohm load. Harmonics are at least 30 dB and spurious outputs are at least 80 dB.

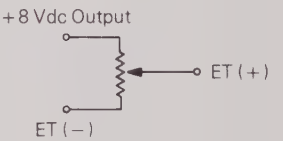
SPECIFICATIONS

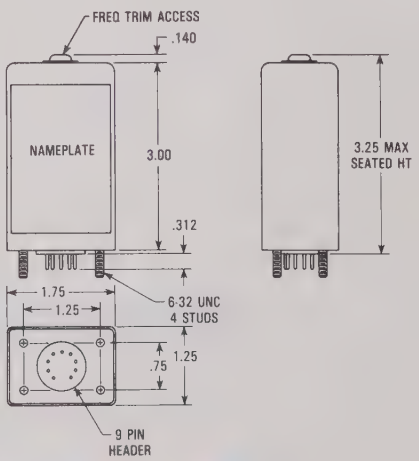
OUTPUT FREQUENCY: 1, 5, 10 MHz, standard
OUTPUT VOLTAGE: 1 Vrms ±20% into a 50 ohm load, sine wave. Short circuit protection.
AGING RATE: Model 1100-5 5×10^{-9}/24 hrs. after 72 hrs. continuous operation
Model 1100-2 2×10^{-9}/24 hrs. after 72 hrs. continuous operation
Model 1100-1 1×10^{-9}/24 hrs. after 72 hrs. continuous operation
RETRACE: $\pm 1 \times 10^{-8}$ of previous frequency after 60 minutes operation following a 24-hour off time ($\pm 5 \times 10^{-9}$ is typical)
STABILITY:
Short term: $< 3 \times 10^{-11}$ for one second averaging time
As a function of
supply voltage: $\pm 1 \times 10^{-9}$ for a ±10% change from 27 Vdc
As a function of load: $\pm 1 \times 10^{-9}$ for a ±10% change from 50 ohms
As a function of
ambient temperature: $< 1.5 \times 10^{-8}$ from −5°C to + 55°C
$< 2.5 \times 10^{-8}$ from −20°C to + 65°C
INPUT VOLTAGE: 27 Vdc ±10%, protected for polarity reversal
INPUT POWER:
(27 volts input): 4 watts typical during warm-up
2 watts typical operating at +25°C
TUNING RANGE: Mechanical 2.5×10^{-6} minimum
MECHANICAL:
Size: 1.25 × 1.75 × 3.25 inches (3.12 × 4.37 × 8.12 cm)
Weight: 7 ounces (196 g)
Mounting: (4) 6-32 × .45 studs
Header: Standard 9-pin miniature
Sealing: Case is sealed. Mechanical frequency adjustments via gasketed screw
Case: Steel
Finish: Gray lacquer

PIN CONNECTIONS

1—DC Gnd.
2—+4 Vdc Reg Out
3—DC Input
4—R.F.
5—R.F.
6—+8 Vdc Reg Out
7—Electrical tuning (−)
8—Electrical tuning (+)
9—Case Gnd

Electrical Tuning Circuit





OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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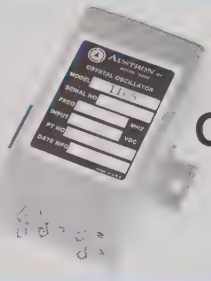
MODEL 1105



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1105 is a low profile solid-state crystal oscillator designed to provide a highly stable 1 MHz logic output for IC applications. The Model 1105 is hermetically sealed and operates from a 5-volt power supply.

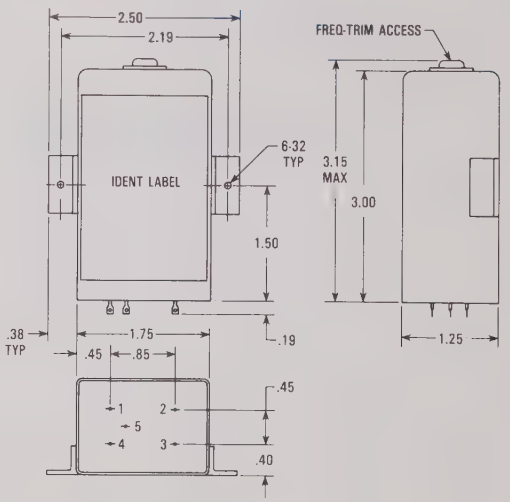
The unit uses a third-overtone precision crystal in the basic design associated with the Model 1100. Thus, the size, weight, and stability performance have been packaged in a configuration for the IC instrument designer.

SPECIFICATIONS

OUTPUT FREQUENCY: 1 MHz
OUTPUT VOLTAGE: TTL logic
AGING RATE: 10, 5, 2, or 1×10^{-9}/24 hours after 72 hours warm-up
(Specify when ordering)
RETRACE: $\pm$ 1 $\times$ 10^{-8} of previous frequency after 60 minutes operation following a 24-hour off time ($\pm 5 \times 10^{-9}$ is typical)
STABILITY:
Short-term: $< 3 \times 10^{-11}$ for one second averaging time
As a function of
supply voltage: Oscillator 5 Vdc changed 2% $< 5 \times 10^{-9}$
Oven 5 Vdc changed 5% $< 5 \times 10^{-9}$
As a function of
ambient temperature: 0°C to +55°C, $< 2 \times 10^{-8}$
INPUT VOLTAGE: Oscillator +5 Vdc $\pm$1% 50 mA
Oven +5 Vdc $\pm$5% 350 mA (during warm up),
260 mA (after warm up)
TUNING RANGE: Mechanical 1×10^{-6} minimum
TEMPERATURE RANGE: Operating 0°C to +55°C
Storage −60°C to +100°C
MECHANICAL:
Size: 1.25 × 1.75 × 3.25 inches (3.12 × 4.37 × 8.12 cm)
Weight: 7 ounces (196 g)
Mounting: See drawing
Header: Solder pins
Sealing: Case is sealed. Mechanical frequency adjustments via gasketed screw
Case: Steel
Finish: Gray lacquer

PIN CONNECTIONS

1—+5 Oven
2—Hi Output
3—Lo Output
4—+5 OSC
5—Ground



OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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MODEL 1111

GENERAL

The Austron Model 1111 is a compact, fast warm-up, low phase noise oscillator specifically developed for both mechanical and electrical replacement of the discontinued HP 10811. The Model 1111 employs the latest oven and crystal technology assuring minimum warm-up time and maximum temperature stability. This oscillator finds application where compact size as well as extremely good frequency stability is required. Its features include:

- Compact Size, 2.06 × 2.83 × 2.45 inches
- Low Phase Noise, 120 dB @ 10 Hz; 160 dB @ 10 kHz
- Excellent temperature stability, $<4.5 \times 10^{-9}$ from −55°C to +71°C
- Fast warm-up within 5×10^{-9} of final value after 10 minutes
- $<5 \times 10^{-10}$/24 hr. aging rate

CRYSTAL OSCILLATOR

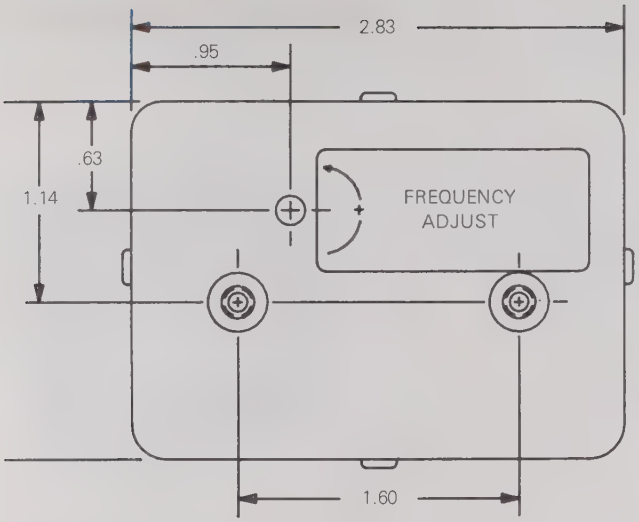
SPECIFICATIONS

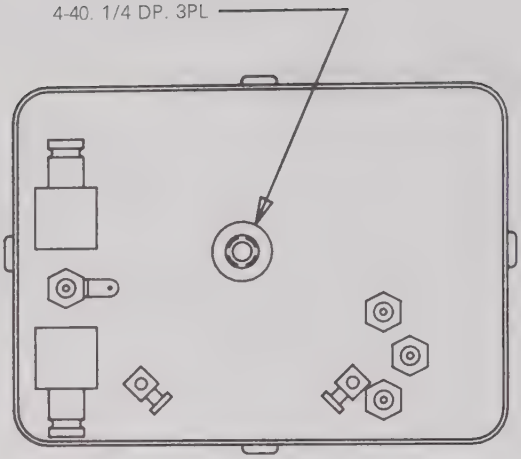
OUTPUT FREQUENCY: 10 MHz
OUTPUT VOLTAGE: .55 ±0.5 Vrms into 50 ohms/1 Vrms ±20% into 1000 ohms
AGING RATE: $<5 \times 10^{-10}$/24 hr. after 24 hour warm-up with less than 24 hour off time
WARM-UP TIME: 10 minutes maximum after turn on within 5×10^{-9} of final value @ 25°C for oscillator off-time of less than 24 hours
STABILITY:
Short-term: $<5 \times 10^{-12}$ for a 1 second average
Frequency vs. oscillator supply voltage: $<2 \times 10^{-10}$ for 1% change (<100 μV ripple)
Frequency vs. oven supply voltage: $<1 \times 10^{-10}$ for a 10% change (<30 mV ripple)
Frequency vs. load: $<5 \times 10^{-10}$ for a ± 10% load change into 50 ohms, or for a ± 25% load change into 1 k ohms
Frequency vs. temperature: $<4.5 \times 10^{-9}$ (−55°C to +71°C); $<2.5 \times 10^{-9}$ (0°C to +71°C)
INPUT VOLTAGE:
Oscillator: 11.0 to 13.5 Vdc, 22 mA typical; 30 mA maximum
Oven: +20 to +30 Vdc max; 15W maximum during warm-up; 2W @ 25°C after warm-up
TUNING RANGE:
Mechanical: $\geq \pm 1 \times 10^{-6}$ (± 10 Hz) with 18-turn control
Electrical: $>1 \times 10^{-7}$ (1 Hz) total, −5 Vdc to +5 Vdc
MECHANICAL:
Size: 2.06 × 2.83 × 2.45 inches
Weight: 300 grams
Mounting: (3) 4-40 ¼ DP mounting studs
Connector: Solder terminals and SMB connectors

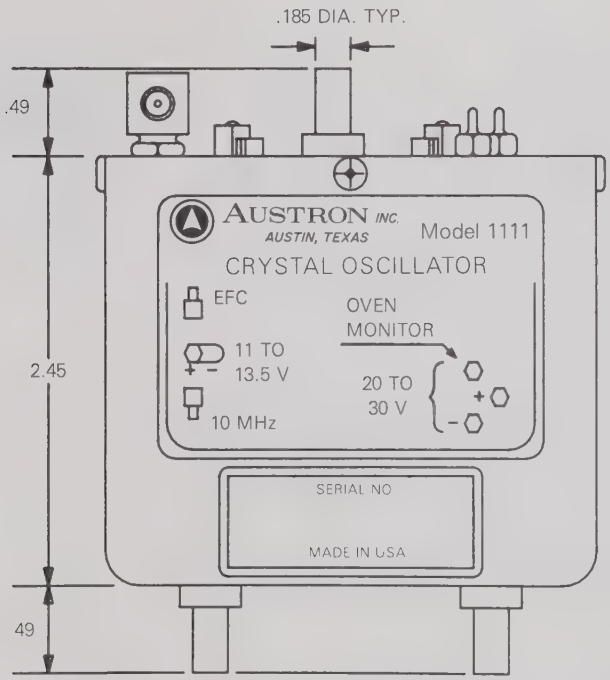
OPTIONS

- Lower phase noise
- Non-standard frequencies, input voltages, tuning ranges, etc.
- Various mechanical configurations

PIN CONNECTIONS







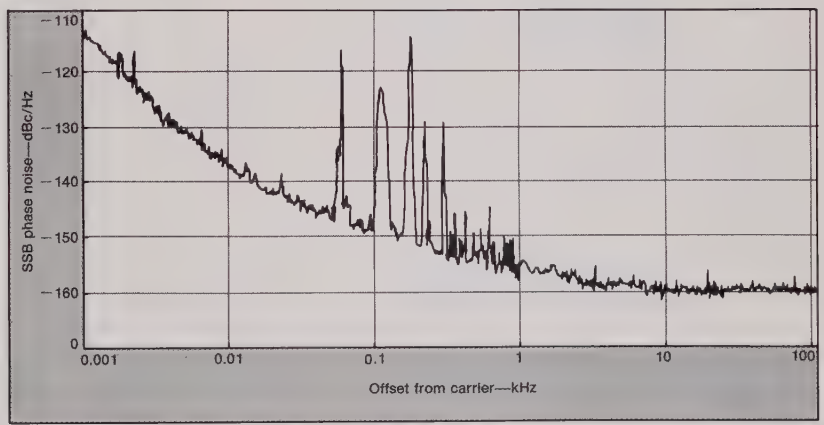
Oscillator offers reference retrofit

This 10-MHz crystal oscillator replaces the old HP 10811A reference source with improved SSB phase-noise performance.

THE model 1111 reference oscillator from Austron, Inc., is an excellent replacement for the discontinued Hewlett-Packard HP 10811A. The new oscillator combines advanced crystal technology with an efficient oven design for fast warmups and good frequency stability with temperature. A standard model 1111 operates at 10 MHz, although other frequencies are optional. It stabilizes to within 5×10^{-9} of its final frequency after only a 10-min warmup.

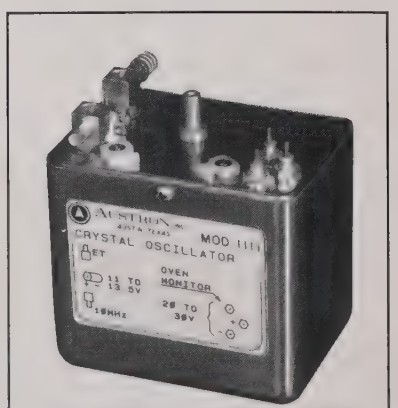
The crystal oscillator has superb SSB phase-noise performance (as measured on the Hewlett-Packard HP 3047A test set), even at offsets as close as 1 Hz (Fig. 1). The manufacturer specifies the phase noise as −120 dBc/Hz for 10-Hz offsets and −160 dBc/Hz for 10-kHz offsets.

The model 1111 generates output voltages of 0.55±0.50 V RMS into a 50-Ω load and 1.0±0.2 V RMS into a 1-kΩ load, exactly matching the voltage specifications of the HP 10811A. The aging rate of the 1111 is better than 5×10^{-10} after a 24-hr warmup period. The 10-MHz frequency changes less than 1×10^{-10} for a 1-percent variation in the oscillator supply voltage. The frequency stability is rated as less than 5×10^{-10} for a 10-percent variation in the oven supply voltage. The frequency stability with temperature is better than 4.5×10^{-9} from −55 to +71°C and better than 2.5×10^{-9} from 0 to +71°C. The oscillator's output frequency changes less than 5×10^{-10} for a ±10-percent load change into 50 Ω.



1. The SSB phase noise *characteristics of the model 1111 crystal oscillator are specified at −120 dBc/Hz for 10-Hz offsets and −160 dBc/Hz for 10-kHz offsets.*

The reference source requires an oscillator supply of 11.0 to 13.5 VDC at 22 mA (30 mA maximum) and an oven supply of +20 to +340 VDC maximum, with 15-W power consumption during warmup and 2-W power consumption when operating at +25°C after warmup. The oscillator is equipped with an 18-turn control for mechanical tuning over a ±10-Hz range. P&A: $1500; 60 days. **Austron, Inc., P.O. Box 14766, Austin, TX 78761-4766; (512) 251-2313, TWX: 910-874-1356.**



2. The model 1111 *measures 2.06 × 2.83 × 2.45 in. and provides a precise electrical and mechanical retrofit for the discontinued HP 10811A source.*

Ron Myers, Product Manager, Austron, Inc., P.O. Box 14766, Austin, TX 78761-4766; (512) 251-2313, TWX: 910-874-1356

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MODEL 1115

GENERAL

The Austron Model 1115 was specifically designed for undersea applications where high stability and minimal power drain are of prime importance. The Model 1115 features:

- 1×10^{-9}/24 hr. stability
- 150 mw power drain @ +25°C
- Remote tuning
- High reliability

SPECIFICATIONS

OUTPUT FREQUENCY: 5 MHz
OUTPUT VOLTAGE: 1 Vrms ±10% into 200-ohm load, sine wave. Short circuit protection.
AGING RATE: 3×10^{-9}/24 hrs. after 72 hours operation
1×10^{-9}/24 hrs. after 30 days operation
STABILITY:
As a function of
supply voltage: $\pm 1 \times 10^{-9}$ for a ±5% change from 12 Vdc
As a function of load: $\pm 1 \times 10^{-9}$ for a ±10% change from 200 ohms
As a function of
ambient temperature: $< 5 \times 10^{-9}$ from −2°C to +25°C
INPUT VOLTAGE: 12 to 15 Vdc ±5%
POWER DRAIN:
(12 volts DC input): 150 mw @ +25°C
195 mw @ +20°C
300 mw @ −5°C
TUNING (all electrical): 1000×10^{-9} minimum
OPERATING TEMPERATURE: −10°C to +35°C
MECHANICAL:
Size: Cylinder 2" diameter, 5.5" long (5 cm, 13.75 cm)
Weight: 12 ounces (336 g)
Machined aluminum container, hermetically sealed

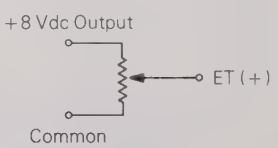
OPTIONS

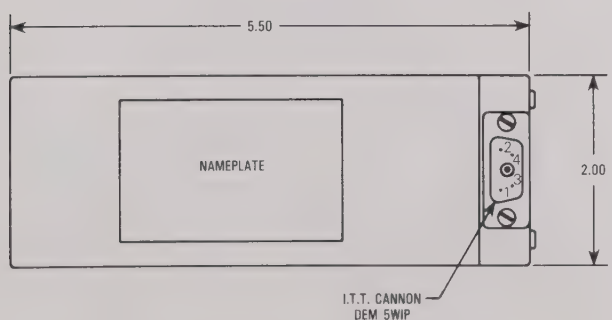
- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

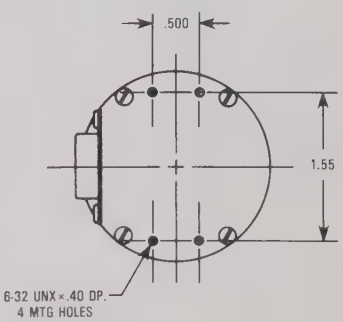
PIN CONNECTIONS

1—Electrical Tuning (+)
2—+8 Vdc Output
3—Input Vdc (+)
4—Common
Coax. 5 MHz Output

Electrical Tuning Circuit







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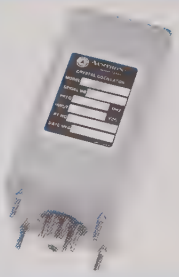
MODEL 1120



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1120 is a compact, rugged crystal oscillator designed for use in counters, synthesizers and communications systems. The Model 1120 employs a precision crystal mounted in a high-gain, solid-state DC proportional oven to assure minimal frequency shifts due to changes in the environment. Proportional oven control also assures freedom from frequency changes due to cycling thermostats. Crystal drive is held constant by a high-gain AGC system to assure good long-term aging. The Model 1120 features:

- 10^{-9}/day aging
- Excellent short-term stability
- Low phase noise
- Fast warm-up
- Good retrace
- Low power consumption

SPECIFICATIONS

OUTPUT FREQUENCY: 1, 5, 10 MHz standard

OUTPUT VOLTAGE: 1 Vrms ±20% into a 50 ohm load, sine wave. Short circuit protection.

AGING RATE:
- Model 1120-5: 5×10^{-9}/24 hrs. after 72 hrs. continuous operation
- Model 1120-2: 2×10^{-9}/24 hrs. after 72 hrs. continuous operation
- Model 1120-1: 1×10^{-9}/24 hrs. after 72 hrs. continuous operation

RETRACE: $\pm 1 \times 10^{-8}$ of previous frequency after 60 minutes operation following a 24-hour off time ($\pm 5 \times 10^{-9}$ is typical)

STABILITY:

Short-term: $< 3 \times 10^{-11}$ for one second averaging time

As a function of
supply voltage: $\pm 1 \times 10^{-9}$ for a ±10% change from 27 Vdc

As a function of load: $\pm 1 \times 10^{-9}$ for a ±10% change from 50 ohms

As a function of
ambient temperature: $< 1 \times 10^{-8}$ from −5°C to +50°C
$< 2 \times 10^{-8}$ from −20°C to +65°C

INPUT VOLTAGE: 27 Vdc ±10%, protected from polarity reversal

INPUT POWER: < 5 watts during warm-up
< 3 watts operating at +25°C

TUNING RANGE: Mechanical: 2.5×10^{-6} minimum

MECHANICAL:

Size: 2.27 × 2.14 × 4 inches (5.67 × 5.35 × 10 cm)

Weight: 9 ounces (252 g)

Mounting: (4) 6-32 studs

Header: Octal

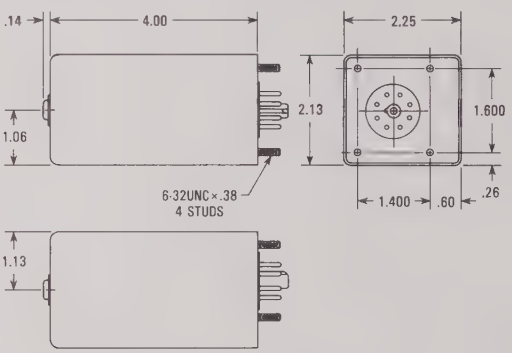
Sealing: Case is hermetically sealed. Mechanical adjustment via gasketed screw

Case: Steel

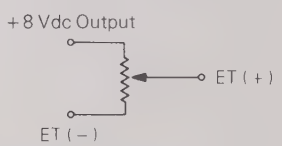
Finish: Gray lacquer

PIN CONNECTIONS

1—DC Input (−)
2—+4 Vdc Output
3—DC Input (+)
4—Output (+)
5—Output (−)
6—+8 Vdc Output
7—Electrical tuning (−)
8—Electrical tuning (+)



Electrical Tuning Circuit



OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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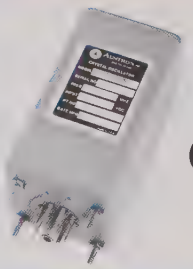
MODEL 1120FW



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1120FW is a compact, rugged, fast warm-up crystal oscillator designed for airborne navigation systems where minimal warm-up time and good retrace characteristics are of prime importance. The Model 1120FW employs a precision crystal mounted in a high-gain, solid-state, DC proportional oven to assure minimum frequency shifts due to changes in the environment. There is an additional boost oven which operates during initial turn-on substantially improving the oscillator's warm-up characteristics. The Model 1120FW features:

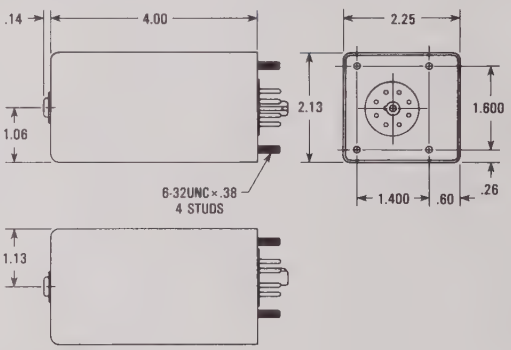
- 10^{-4}/day aging
- Within 2×10^{-8} after 10 minutes
- Low phase noise
- Excellent retrace

SPECIFICATIONS

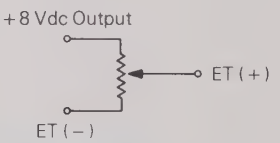
OUTPUT FREQUENCY: 1, 5, 10 MHz, standard
OUTPUT VOLTAGE: 1 Vrms ±20% into a 50 ohm load, sine wave. Short circuit protection.
AGING RATE: 1×10^{-9}/24 hrs. after 72 hrs. continuous operation
WARM-UP: Within 2×10^{-7} after 5 minutes; 2×10^{-8} after 10 minutes; 1×10^{-8} after 20 minutes
RETRACE: $\pm 1 \times 10^{-8}$ of previous frequency after 60 minutes operation following a 24-hour off time ($\pm 5 \times 10^{-9}$ is typical)
STABILITY:
Short-term: $< 3 \times 10^{-11}$ for one second averaging time
As a function of
supply voltage: $\pm 1 \times 10^{-9}$ for a ±10% change from 27 Vdc
As a function of load: $\pm 1 \times 10^{-9}$ for a ±10% change from 50 ohms
As a function of
ambient temperature: $< 1 \times 10^{-8}$ from −5°C to +50°C
$< 2 \times 10^{-8}$ from −20°C to +65°C
INPUT VOLTAGE: 27 Vdc ±10% protected for polarity reversal
INPUT POWER: < 30 watts during warm-up
< 3 watts operating at +25°C
TUNING RANGE: Mechanical: 2.5×10^{-6} minimum
MECHANICAL:
Size: 2.27 × 2.14 × 4 inches (5.67 × 5.35 × 10 cm)
Weight: 9 ounces (252 g)
Mounting: (4) 6-32 studs
Header: Octal
Sealing: Case is hermetically sealed. Mechanical adjustment via gasketed screw
Case: Steel
Finish: Gray lacquer

PIN CONNECTIONS

1—DC Input (−)
2—+4 Vdc Output
3—DC Input (+)
4—Output (+)
5—Output (−)
6—+8 Vdc Output
7—Electrical tuning (−)
8—Electrical tuning (+)



Electrical Tuning Circuit



OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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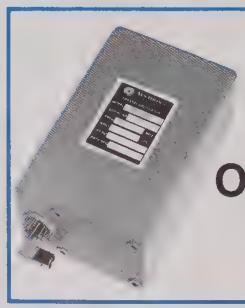
MODEL 1150



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1150 is a very rugged, high-precision crystal oscillator which was specifically developed for use in satellite navigation systems. The Model 1150 employs a high-quality 5 MHz, high-temperature bake-out crystal unit which exhibits exceptional retrace and long-term aging characteristics. The crystal is mounted in a proportionally controlled oven which is mounted in a thermal flask. This assures excellent isolation from frequency shifts due to environmental temperature changes. A high-gain AGC system is used to keep the crystal drive level constant, assuring excellent long-term aging. The Model 1150 has application whenever system requirements demand a precise time base or frequency reference. Its features include:

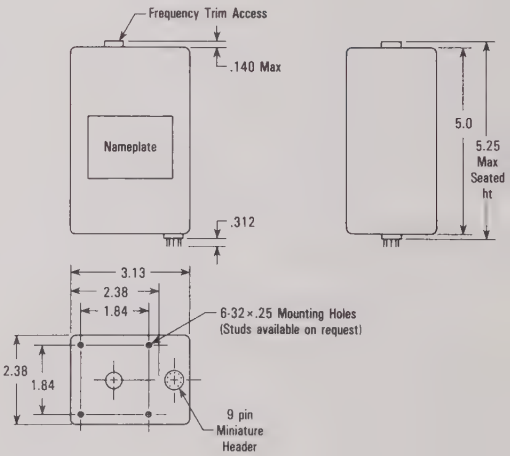
- An ultimate aging of 5×10^{-11}/day
- Exceptional medium- and short-term stability
- Low phase noise
- Proportional oven
- Low power drain
- Excellent temperature stability

SPECIFICATIONS

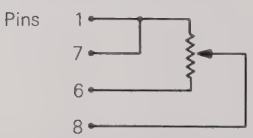
OUTPUT FREQUENCY: 5 MHz, standard
OUTPUT VOLTAGE: 1 Vrms ±20% into a 50 ohm load, sine wave. Short circuit protection.
AGING RATE: 5×10^{-10}/24 hrs. after 24 hrs. operation. 1×10^{-10}/24 hrs. after 30 days operation. Ultimate drift is typically 5×10^{-11}/24 hrs. after 90 days operation.
RETRACE: $\pm 1 \times 10^{-9}$ of previous frequency after 2 hours operation following a 24 hour off time
STABILITY:
Short-term: $< 7 \times 10^{-12}$ for 1 to 100 second averaging times
As a function of
supply voltage: $< \pm 5 \times 10^{-10}$ for a ±10% change from 27 Vdc
As a function of load: $< \pm 1 \times 10^{-10}$ for a ±10% change from 50 ohms
As a function of
ambient temperature: $< 2 \times 10^{-9}$ from −40°C to +60°C
$< 5 \times 10^{-10}$ from 0°C to +50°C
INPUT VOLTAGE: 27 Vdc ±10%, floating, protected against polarity reversal
INPUT POWER: 18 watts at 27 volt input
(27 volts input): 4.5 watts typical operating at +25°C
TUNING RANGE: Mechanical: 300×10^{-9} minimum
MECHANICAL:
Size: 2.37 × 3.19 × 5 inches (5.94 × 7.97 × 12.50 cm)
Weight: 2 pounds maximum (896 g)
Mounting: (4) 6-32 mounting noles
Socket: 9-pin miniature
Sealing: Case is sealed. Mechanical frequency adjustment via gasketed screw

PIN CONNECTIONS

1—DC Input (−)
2—RF Mon.
3—DC Input (+)
4—RF Output
5—RF Output
6—+8 Vdc Output
7—Electrical tuning (−)
8—Electrical tuning (+)
9—Oven Mon.



Electrical Tuning Circuit



10 K ohms potentiometer

OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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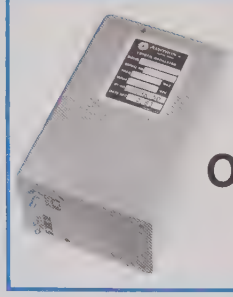
MODEL 1151



CRYSTAL OSCILLATOR

GENERAL

The Austron Model 1151 is a very rugged, high-precision crystal oscillator which was specifically developed for use in satellite navigation systems. The Model 1151 employs a high-quality, high-temperature bake-out crystal unit which exhibits exceptional retrace and long-term aging characteristics. The crystal is mounted in a proportionally controlled oven which is mounted in a thermal flask. This assures excellent isolation from frequency shifts due to environmental temperature changes. A high-gain AGC system is used to keep the crystal drive level constant, assuring excellent long-term aging. The Model 1151 has application whenever system requirements demand a precise time base or frequency reference. Its features include:

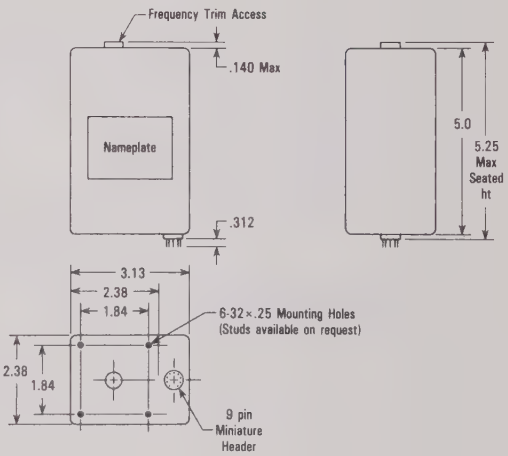
- An ultimate aging of 3×10^{-10}/day
- Exceptional medium- and short-term stability
- Low phase noise
- Proportional oven
- Low power drain
- Excellent temperature stability

SPECIFICATIONS

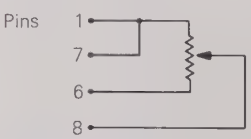
OUTPUT FREQUENCY: 5 MHz or 10 MHz
OUTPUT VOLTAGE: 1 Vrms ±20% into a 50 ohm load, sine wave. Short circuit protection.
AGING RATE: 9×10^{-10}/24 hrs. after 72 hrs. operation
3×10^{-10}/24 hrs. after 30 hrs. operation
RETRACE: $\pm 1 \times 10^{-9}$ of previous frequency after 2 hours operation following a 24 hour off time
STABILITY:
Short-term: $< 2 \times 10^{-11}$ for 1 to 100 second averaging times
As a function of
supply voltage: $< \pm 5 \times 10^{-10}$ for a ±10% change from 27 Vdc
As a function of load: $< \pm 1 \times 10^{-10}$ for a ±10% change from 50 ohms
As a function of
ambient temperature: $< 2 \times 10^{-9}$ from −40°C to +60°C
$< 5 \times 10^{-10}$ from 0°C to +50°C
INPUT VOLTAGE: 27 Vdc ±10%, against protected floating, polarity reversal
INPUT POWER: 18 watts typical during warm-up
4.5 watts typical operating at +25°C
TUNING RANGE: Mechanical 300×10^{-9} minimum
MECHANICAL:
Size: 2.37 × 3.19 × 5 inches (5.94 × 7.97 × 12.50 cm)
Weight: 2 pounds maximum (896 g)
Mounting: (4) 6-32 mounting holes
Socket: 9-pin miniature
Sealing: Case is sealed. Mechanical frequency adjustment via gasketed screw

PIN CONNECTIONS

1 – DC Input (−)
2 – RF Mon.
3 – DC Input (+)
4 – RF Output
5 – RF Output
6 – +8 Vdc Output
7 – Electrical tuning (−)
8 – Electrical tuning (+)
9 – Oven Mon.



Electrical Tuning Circuit



10 K ohms potentiometer

OPTIONS

- Non-standard frequencies, input voltages, tuning ranges, etc.
- MIL-spec, JANTX, Radiation hardened
- Quality control — MIL-Q-9858A
- Various mechanical configurations

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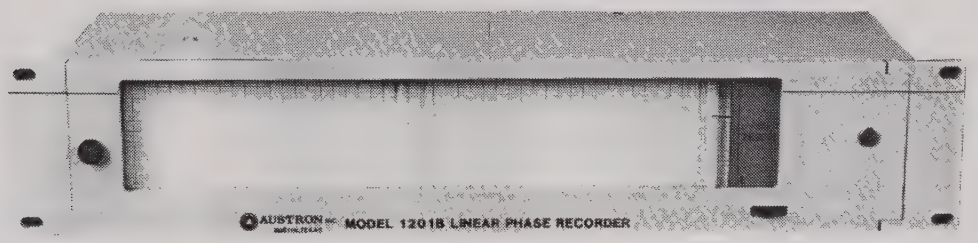
MODEL 1201B



LINEAR PHASE RECORDER

GENERAL

The **Austron Model 1201B Linear Phase Recorder** produces a chart record that is directly proportional to the phase difference between two sinusoidal or square wave inputs.

Consider, for example, a system containing two 1 MHz frequency standards and a **Model 1201B**. If the frequency standards remain at exactly the same frequency, the chart record of phase vs time will be a straight line having zero slope. If there is frequency offset the time gained or lost may be read directly with a resolution of better than 100 nanoseconds. Full scale deflection of the recorder will correspond to 360° or 1 microsecond. The slope of the chart recording is proportional to the frequency offset.

APPLICATIONS

- Direct recording of accumulated phase (time) between two stable frequency sources such as Loran–C and a local frequency standard

FEATURES

- High resolution and accuracy
- Simple straightforward operation
- High reliability

SPECIFICATIONS

ELECTRICAL

Inputs:
Sine wave: 100 Hz to 5 MHz, 0.3 to 10 Vrms
Square wave: 100 Hz to 5 MHz, 1.5 to 30 Vp-p

Recorder:
1 inch per hour, 1800 strikes per hour, Rectilinear paper, Full 12 hour viewing area, Front panel paper advance

Resolution:
7.2° per minor division

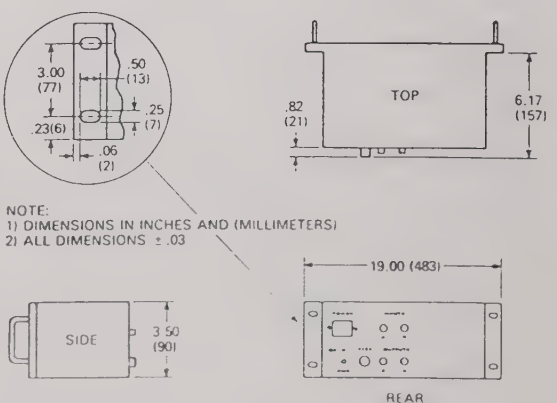
Phase Measurement Accuracy:
Accuracy is limited by circuit switching time and is therefore dependent on frequency. At 1 MHz and below, accuracy is typically 5% of full scale.

Power:
115 Vac ± 15%, 60 Hz, 5 watts
115/230 Vac, 50/60 Hz option available

PHYSICAL

Mounting:
19 inch rack mounting

Accessory Package:
Power cord, roll of chart paper, spare fuses, and technical manual



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MODEL 1210D

PORTABLE CRYSTAL CLOCK

GENERAL

The Austron Model 1210D Series of Portable Crystal Clocks are compact, self-contained, self-powered time references providing stable time outputs at several pulse and sinusoidal frequencies.

The 1210D Series contain a precision quartz oscillator and a series of dividers which reduce the oscillator rate to one pulse per second. A digital phase shifter having 0.2 microsecond (μs) resolution is included at the head of the divider chain to allow the timing pulses to be synchronized to a master clock.

SPECIFICATIONS

ELECTRICAL

Frequency Standard:

Austron Model 1150 high stability component-type crystal oscillator capable of $\pm 1 \times 10^{-10}$ per day after 30 days continuous operation.

SINUSOIDAL OUTPUTS:

Frequency:

1210D – 5 MHz, 1 MHz, 1 MHz
1210D-01 – 10 MHz, 5 MHz, 1 MHz, 100 kHz
1210D-02 – 5 MHz, 1 MHz, 60 Hz
1210D-03 – 10 MHz, 5 MHz, 1 MHz

Amplitude:

1 Vrms into 50 ohms, all models

Harmonic Distortion:

– 30 db from rated output, all models

Spurious Signals:

– 60 db from rated output, all models

PULSE OUTPUTS:

Rate:

1210D – 1 PPS
1210D-01 – 1 PPS
1210D-02 – 1 PPS and 1 PP 10S
1210D-03 – 100 PPS and 1 PPM, 1 PPS

Amplitude:

+ 5V peak minimum, into 50 ohms, all models

Width:

5 to 25 μs at the 50% amplitude points, all models

Jitter:

Less than 50 nanoseconds, all models

(Specifications continued on page 2.)

APPLICATIONS

The 1210D Series of clocks are used to transfer precise time from one geographic location to another. They are packaged in a rugged carrying case approximately 8½ inches high, 8½ inches wide and 14 inches long permitting upright storage under the passenger seat found on most commercial aircraft.

FEATURES

- ☐ Digital time-of-day display
- ☐ Meter monitors oscillator, oven and battery circuits
- ☐ Sinusoidal outputs of 10 MHz, 5 MHz, 1 MHz, 100 kHz and 60 Hz are available
- ☐ Standard pulse output of 1 PPS, all models
- ☐ Optional combinations of three additional pulse rates may be selected: 1 PP 100S, 1 PP 60S, 1 PP 10S, 1 PPS, 2 PPS, 10 PPS, 10^2 PPS, 10^3 PPS, 10^4 PPS, and 10^5 PPS
- ☐ Power may be obtained from AC, DC, or eight-hour internal battery pack

SPECIFICATIONS 1210D Continued

SYNCHRONIZATION OF PULSE OUTPUTS

Manual:

Clock circuit may be slewed manually at 0.2, 2, 200, 2K, or 20K μs/sec rates. The resolution of the phase shifter is 0.2 μs.

Automatic:

Clock will synchronize automatically with an external reference pulse of 3 volt peak amplitude or greater and a duration of at least one μs. The clock pulse will be within 0.4 μs of the reference pulse after automatic synchronization.

Performance of the timing outputs can be computed from the relationship:

$\Delta t = 8.64 \frac{\Delta f}{f} T + 4.32kT^2$; where

Δt = time gained or lost in μs

$\frac{\Delta f}{f}$ = frequency offset expressed as parts in 10^{10}

T = time in days

k = drift rate of the oscillator expressed as parts in 10^{10}

TEMPERATURE RANGES

Operating:

0°C to +50°C

Low Charge:

0°C to +50°C

Hi Charge:

0°C to +35°C

Storage:

−40°C to +85°C with internal batteries removed

Frequency Change with Temperature:

Less than $\pm 2 \times 10^{-10}$ over a temperature range of 0° to +35°C

POWER REQUIREMENTS

Operation:

115/230 Vac ± 10%, 48-420 Hz

Low Charge:

30 watts AC

Hi Charge:

55 watts AC

Auxiliary:

22-32 Vdc, 750 mA

Portable:

Internal Battery Pack will power clock for 8 hours. Battery may be charged during AC operation.

PHYSICAL

Time-of-Day Display:

24 Hour Digital Read-Out (Hr/Min/Sec)

Weight:

22 pounds (10 kg)

Dimensions:

8½ x 8½ x 15 inches (21.6 x 21.6 x 38.1 cm)

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MODEL 1250A

CRYSTAL FREQUENCY STANDARD

GENERAL

The Austron Model 1250A Crystal Frequency Standard generates highly stable output frequencies at 5 MHz, 1 MHz, 100 kHz, and 1 MHz clock drive. Each of these outputs has excellent waveform and spectral purity.

The Model 1250A employs an Auston Model 1150 Crystal Oscillator. In the Model 1150, a highly stabilized feedback amplifier is used in connection with an AGC system to maintain the crystal power at the low constant value that is necessary to attain high frequency stability.

SPECIFICATIONS

ELECTRICAL

Input Voltage:
115/230 Vac ± 10%, 48-420 Hz
17-35 Vdc negative ground, 12 watts maximum.

Standby Power:
Internal Nicad battery pack provides 10 hours of standby power at +25°C.

Battery Recharge Time:
14 to 16 hours.

OPERATING

Output Frequencies:
5 MHz, 1 MHz, 100 kHz, and 1 MHz clock drive, sinusoidal.

Output Voltages:
1 Vrms into 50 ohms, clock drive, 0.5 Vrms into 1000 ohms.

Alarm Output:
Contact closure on AC power failure. Contacts rated 5a, 120 Vac.

Frequency Adjustments:

Fine:
90×10^{-9} with digital dial having 5000 divisions.

Coarse:
300×10^{-9}, access through front panel.

External (elect.):
5×10^{-8} with +5 to −5 Vdc applied.

(Specifications continued on page 2.)

APPLICATIONS

- ☐ Calibration laboratories.
- ☐ Precision time base for timekeeping systems.

FEATURES

- ☐ High frequency stability.
- ☐ Easy access to all important components.
- ☐ Reliability and long life.
- ☐ Excellent waveform and spectral purity of outputs.
- ☐ Internal battery back-up.
- ☐ External standby input.
- ☐ Automatic switchover on power source.
- ☐ Vernier front panel frequency control.

SPECIFICATIONS 1250A Continued

Stability:

Long Term:

Less than 5×10^{-10} after 24 hours and less than 1×10^{-10}/day after 30 days continuous operation. Ultimate drift is typically 5×10^{-11} after 90 days.

Medium Term: Less than 1×10^{-11} rms for a 120 second averaging time.

Short Term: Less than 5×10^{-12} rms for a one second averaging time.

Retrace: Less than 1×10^{-9} after two hours warm-up, following a 24 hour off-time.

As a function of Ambient Temp.:

Less than $\pm 2 \times 10^{-9}$ from $-10°C$ to $+50°C$.

Load:

Less than $\pm 1 \times 10^{-11}$ from open to 50 ohms.

Supply Voltage:

Less than $\pm 5 \times 10^{-11}$ for 17 to 35 Vdc or 115/230 Vac ± 10%.

Harmonic Distortion:

5 MHz, 1 MHz, 100 kHz, down more than 40 db from rated output.

Non-Harmonically Related Outputs:

5 MHz, 1 MHz, 100 kHz, down more than 80 db from rated outputs.

Storage Temp.:

$-55°C$ to $+75°C$ without batteries.

$-40°C$ to $+50°C$ with batteries.

Operating Temp.:

$-40°C$ to $+50°C$ (Batteries cannot be recharged below $-17°C$).

Humidity:

0 to 95%.

PHYSICAL

Mounting:

Adapters supplied for standard 19 inch rack mounting.

Dimensions:

19 x 3.5 x 11.62 inches
(48.3 × 8.9 × 29.3 cm)

Weight:

20 lbs., 12 oz. (9.41 kg).

Accessories Included:

Extender card, fuses, external power and alarm connector, tuning wand, and technical manual.

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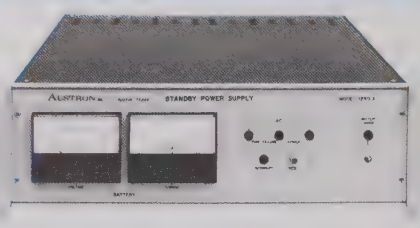
MODEL 1290A



STANDBY POWER SUPPLY

GENERAL

The Austron Model 1290A Standby Power Supply is intended to be used for applications where power must be maintained in the event of extended AC power failure. The 1290A will provide 24 Vdc at a maximum current of three amperes with a total capacity of 19 ampere-hours with fully charged batteries. Internal batteries are of the sealed cell type and require no periodic maintenance. In addition to the internal batteries, provision is also made for use of an external DC power source of 24 to 28 Vdc. If use is made of this feature, the internal batteries would only be used in the event of failure of both AC and external DC. Up to six back panel connectors are available for supplying power to several instruments.

SPECIFICATIONS

ELECTRICAL

Output Voltage:
24V ±2 Vdc with up to six MS 3106A-14S-2P Connectors

Maximum Rated Current:
3 amps @ +25°C

Standby Capacity:
19 ampere-hours

Alarm Indicators:
Fuse failure, AC interrupt, AC power, high charge

Remote Alarm:
SPDT relay contacts. Contacts rated at 10 amps resistive load

Panel Meters:
Voltmeter indicates battery or output voltage. Ammeter indicates battery charge/discharge rate.

Input Power:
115 or 230 Vac ± 10%, 50-400 Hz, 150 watts at maximum charge

PHYSICAL

Dimensions:
20 x 19 x 5¼ inches (50.8 x 48.3 x 13.3 cm)

Weight:
Approximately 56 lbs. (25.4 kg) including batteries

Military Nomenclature, PP-6948. Used in Frequency Control Sets AN/GSQ-183 and AN/GSQ-215.
NSN 5895-00-204-3065

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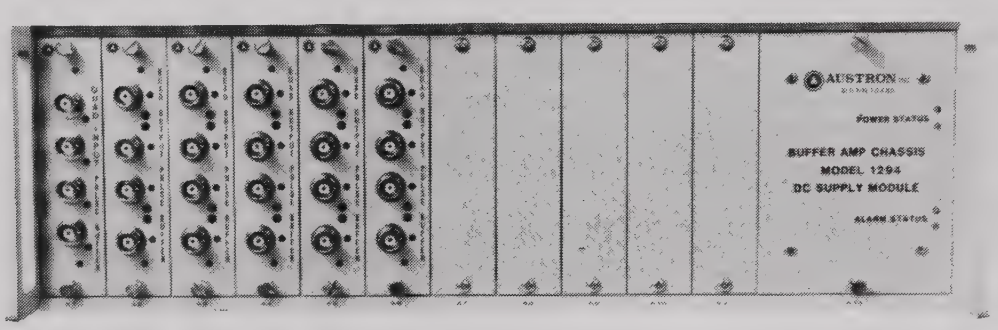
MODEL 1294



PULSE DISTRIBUTION CHASSIS

GENERAL

The AUSTRON Model 1294 Pulse Distribution Chassis is a versatile instrument that can be configured for many digital applications. The Model 1294 distributes pulse rate signals used in timing, telemetry, and instrumentation systems. The unit provides the necessary drive capability to interface a pulse rate signal source to equipment located up to 1000 ft (304.8 m) away.

The input and output signal types and the number of outputs for each signal are customer-specified to provide a cost-effective system. There are input and output modules available for pulse rate signal generation and distribution. A voting switchover module provides redundant signal path configurations with automatic switching on loss of signal or phase coherency. Up to four different signals can be supplied to the output modules. Any combination of I/O modules, up to a total of 11, may be used to give as many as 40 outputs per chassis.

An optional Alarm Indicator Panel is available that provides immediate status indications of all installed slots via LED indicators.

MODEL VARIATIONS

The basic unit of the Model 1294 is called the mainframe and is available in four versions. Each version includes the respective final assemblies along with the manual, power cord, connectors and spare fuses. They include DC-Only and Dual Power Supply variations.

The standard version of the mainframe is Assembly P/N 30411394. It includes the chassis, the AC/DC Power Input module and one Power Supply module. The Power Input module contains the ac and dc power inputs and external alarm connector, the power switch and fuses. The Power Supply module houses the dc regulators and generates the dc voltages required in the unit.

APPLICATIONS

- Metrology Laboratories
- Production Test Departments
- Engineering Laboratories
- Development Laboratories
- Specialized Communications Systems

FEATURES

- 115/230 Vac ±10%, 48 Hz to 420 Hz; or 22 Vdc to 57 Vdc
- Reversible mounting (all outputs on back or front of chassis)
- Built-in test equipment
- Fault isolation to module
- Expandability (40 outputs maximum per chassis)
- Input and output signal monitoring
- 19 in (48.3 cm) rack-mountable with provisions for chassis slides

OPTIONAL FEATURES

- Voter switchover module gives redundant signal path configurations with automatic switching on loss of signal or phase coherency
- DC-only (positive or negative grounding) and dual power supply versions
- Alarm panel providing immediate alarm status LEDs for each module installed

Technical specifications subject to change without notice.

INPUT/OUTPUT MODULES

The input modules available for the Model 1294 provide multiple inputs for pulse rate signal voting or bus distributing. The voting input module monitors three input signals for presence and phase coherency. The selected input is then routed to a bus output and the front panel. The Quad Input module buffers four pulse rate signals and routes them to buses B, C, D and E. The input modules can be configured for a variety of signal distribution requirements.

The Pulse Rate Voter Selector module is an optional input module used only in system applications. It monitors three identical but independent input signals and detects a loss or phase difference of any signal input.

A Remote Voter Selector module is available for external control of the Voter module's signal selection. It utilizes bus A for communication to the Voter modules.

A variety of output modules are available for the Model 1294 Pulse Distribution Chassis. The chassis will be configured with appropriate output modules for the desired system requirements.

SPECIFICATIONS

PHYSICAL

Height:	5.25 in (13.3 cm)
Width:	17 in (43.2 cm)
Rack Mtg. (std.):	19 in (48.3 cm)
Rack Mtg. (opt.):	23 in (58.4 cm)
Depth (behind mtg.):	15.25 in (38.7 cm)
(overall):	17.3 in (43.9 cm)
Weight:	Less than 35 lbs (16 kg)
Ambient Temperature:	0°C to 50°C (operating)
Relative Humidity:	up to 95% (noncondensing)

ELECTRICAL

AC/DC Input Module (ac and dc inputs with automatic switchover)

AC Input:	115/230 Vac ±10% at 2A/1A max. 48 Hz to 420 Hz
DC Input:	22 to 57 Vdc at 5A max. positive or negative ground

DC Input Module (dual dc inputs with diode summing)

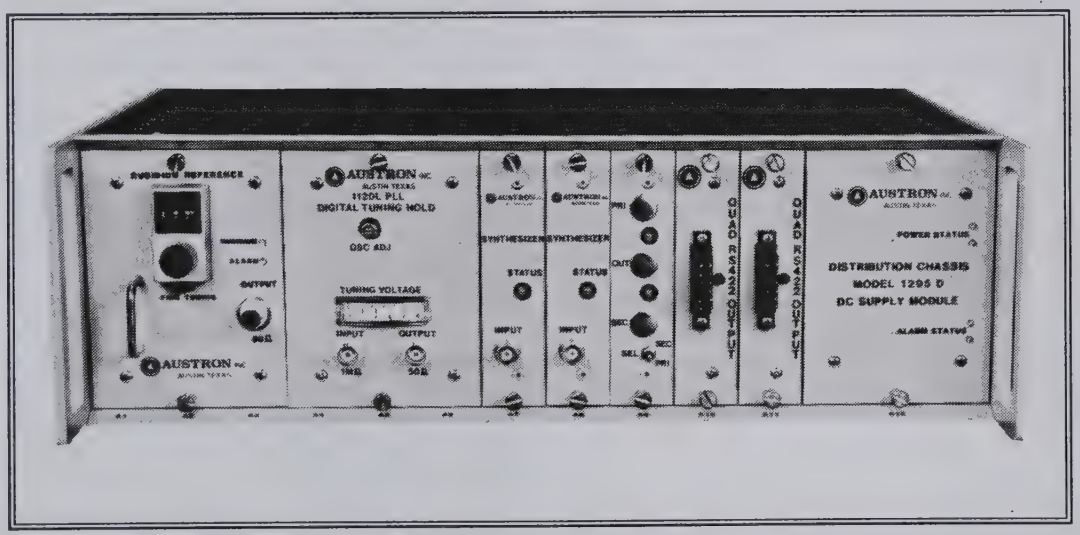
DC Inputs:	22 to 57 Vdc at 5A max. positive or negative ground
Power :	Less than 120 W (dependent on unit configuration)
ALARM Output:	N.O. and N.C. relay contacts
Input Level:	See module specifications
Output Level:	See module specifications

ontact your Austron representative for more module specification information.

AUSTRON MODEL 1295D

DISTRIBUTION CHASSIS

"The Signal Solution"



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AUSTRON MODEL 1295D DISTRIBUTION CHASSIS

GENERAL DESCRIPTION

The Austron Model 1295D Distribution Chassis is an extremely versatile instrument configurable for many applications. The unit design provides for the generation and distribution of timing signals, reference frequencies, and clocking signals for telecommunications, telemetry, and instrumentation systems. Designed from a modular concept, the Model 1295D uses plug-in modules to accomplish these functions. And, because the modules are user-specified, the flexibility of the system is unique in the industry while remaining very cost effective.

Also, the Model 1295D provides the necessary noise immunity and drive capability to interface a frequency standard or other signal source to equipment located up to 1000 feet (304.8 m) away. And this system generates desired frequencies and signal types from a variety of input signals or an internal frequency source. There are input and output modules available for telecommunications applications involving T1 and T2 signals, composite clock signals, and bipolar AMI signals as well as sine or square wave signals. Input/output (I/O) signal types may be: single-ended or balanced; RS422 signals; V.35 signals; modulated time code signals; or fiber optic signals. There are several types of switchover modules that can provide redundant signal path configurations with automatic switching on loss of signal. Up to five signal types can be supplied as outputs in multiples of four of each type. Any combination of I/O modules up to a total of 11 may be used to give as many as 40 outputs per chassis.

Configurations

The Model 1295D Distribution Chassis is configured as a Mainframe that includes the chassis and selected Power Input and Power Supply modules. The unit may include ac/dc or dc-only Power Input and single or dual Power Supply modules. All other modules are selected separately to meet your specific requirements. Power and signal inputs and outputs may be either front- or rear- facing. The mainframe of the Model 1295D is a new design with a backplane interconnect board using 5 busses. Each plug-in module connects to the interconnect board via edge connectors. Configuring the Model 1295D is greatly simplified using jumpers to route each signal by attaching them to the interconnect board. You may now reconfigure the mainframe without using special tools or taking your system off line. The input modules are jumperable to any of the busses and each slot can be jumpered for an output from any bus to an output module.

Alarms

Voltages in the individual power supplies and I/O signals of the Model 1295D are monitored for loss or deterioration. If an output level drops, an indicator on the effected module and a summary alarm indicator light and an alarm relay activates to indicate a system fault. By noting these indicators, the nature of a failure is quickly determined. An optional Alarm Led Panel provides all alarm indications on the unit front panel. The Model 1295D modular design facilitates replacement of a defective module and limits down time to a minimum. Using redundant signal paths and switchover modules, many repairs are accomplished without losing output signals. Mean-time-to-repair (MTTR) for the unit is calculated to be ap-

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proximately 19 minutes including fault isolation, module replacement and repair verification.

Power Requirements

The Model 1295D operates from 115 Vac or 230 Vac, 50 Hz to 400 Hz, or from 20 Vdc to 57 Vdc, positive or negative ground. Automatic switchover to dc power on loss of ac is accomplished with no interruption of operation. The optional dc-only versions provide two inputs with diode summing for operation from dual power bus systems. The power supply module generates internal voltages with redundant modules available to meet very high reliability requirements. Power consumption depends on the chassis configuration but is normally less than 100 watts in a full chassis.

Mounting

The unit mounts in a 19 inch (48.26 cm) or 23 inch (58.42 cm) rack or cabinet and requires 5.25 inches (13.33 cm) of rack space with 15.25 inches (38.74 cm) depth. The chassis mounts with the I/O and power connectors to the rear (standard) or reverse- mounted with the I/O connectors in the front and the power connections to the rear. Mounting holes are also provided for attaching chassis slides and for positioning the rack ears for center mounting the unit in a telephone-type relay rack. The mounting configuration is changed in the field by simply interchanging power modules and/or moving the rack mounting ears. Each Model 1295D includes an extender PCB for module alignment and servicing and blank panels to cover unused I/O slots.

MODEL VARIATIONS

Six versions of the mainframe, the basis of the unit are available. The shipping level part numbers are P/N 30411392, P/N 30411392-1, P/N 30411392-2, P/N 30411392-3, P/N 30411392-4, and P/N 30411392-5. The shipping level includes the respective final assemblies along with the manual, power cord, connectors, and spare fuses. The manual, P/N 12711391, covers all versions of the complete mainframe assembly including the power modules. Individual manual supplements are included for each type of input and output module ordered. The following paragraphs describe the various mainframes.

Standard Mainframe, P/N 30411392

The standard version mainframe includes the chassis, the ac/dc power input module, and one power supply module. The power input module contains the ac and dc power inputs, the external alarm connector, the power switch and fuses. The power supply module houses the dc regulators and generates the dc voltages required in the unit.

DC-Only Negative Ground, P/N 30411392-1

This mainframe is identical to the standard version except for the Power Input module used. The input module is dc-only with negative ground and has dual input connectors with diode summing of input power for dual bus power systems.

Dual Power Supply, P/N 30411392-2

Except for the Dual Power Supply modules, this chassis is identical to the standard version. These power supplies have diode summing to combine the regulated dc outputs. This version is intended for systems where a very high operational reliability is required and provides protection against failure of either of the regulator assemblies. Combined with the use of both ac and dc power inputs, this gives full redundancy to the power supply section of the unit.

DC-Only Negative Ground Dual Power Supply, P/N 30411392-3

This dc-only, negative ground unit is identical to the 30411392-1 mainframe but includes dual power supply modules for redundancy.

DC-Only Positive Ground, P/N 30411392-4

This version is a dc-only, positive ground version identical to the 30411392-1 version except

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it has the dual input diodes connected for positive ground.

DC-Only Positive Ground Dual Power Supply, P/N 30411392-5

This mainframe is a dc-only, positive ground version identical to the P/N 30411392-4 version except it includes dual power supplies for redundancy.

Alarm LED Panel (optional), P/N 10911487

The optional Alarm LED Panel provides front panel indications of each modules' alarms and is used when the mainframe is mounted in the standard configuration with the I/O connections facing the rear.

INPUT MODULES

Input modules available for the Model 1295D are the real key to its versatility. There are buffers, scalers, converters, synthesizers, switching, phase-locked loop oscillator, and other types of input modules as described in the following paragraphs. Refer to the configuration tables in this booklet for all module part numbers.

Buffer/Scaler/Converter Modules

Buffer Input modules serve as buffers to an input signal and clip and amplify it to make the output independent of input level and waveform, then filter and amplify the signal to generate a pure sine wave output at the input frequency. The Scaler Input modules work in a similar fashion but include digital divider chains to generate subharmonics of the input frequency. Both are available in single or dual frequency versions to give one or two outputs with one buffered and one scaled or both buffered or scaled. The Converter/Buffer modules perform conversion of signal types and/or buffering of input signals.

Synthesizer Modules

Synthesizer Input modules are available in a large variety of input/output frequency combinations to produce outputs that are phase-locked to the input frequency. These modules' outputs are either square wave outputs suitable for driving the standard Quad Wideband (QWB), RS422, G.703 or V.35 modules; or RS422 outputs for driving the RS422, G.703 or V.35 output modules. Some versions are available with AMI (automatic mark inversion) format output for T1 systems. Filter modules are available for some frequencies to generate a sine wave output from the synthesizer. Other frequencies may be available for the synthesizer modules in addition to the ones listed. Consult your AUSTRON representative for information about configuring other frequencies.

Phase-Locked Loop Oscillator Modules

The Phase-Locked Loop Oscillator modules provide a way to 'dejitterize' an incoming signal and also provide a backup signal source in case of input signal loss. The Digital Hold PLL modules hold the last input frequency on loss of the input. These PLL modules provide the long-term stability of the input signal and short-term stability of the AUSTRON Model 1120L oscillator. They supply a low phase noise output signal to the distribution bus or to the front panel and are available with 1.544 MHz, 2.048 MHz, 5 MHz, 10 MHz or 6.312 MHz oscillators. The 5 MHz and 10 MHz versions lock to either a 1 MHz, 5 MHz or 10 MHz input signal. The other versions are for 'dejitterizing' telecommunications clock signals. These modules require three slots in the mainframe to accommodate the oscillator package.

Rubidium Oscillator Modules

Excellent long-term stability is attained with this Rubidium Reference module providing a 10 MHz frequency source. The module has a front panel vernier adjustment dial to set the output frequency and is used as a signal source for other modules in the chassis or with only output modules for distributing 10 MHz reference signals. The unit requires three slots in the chassis. The Rubidium PLL module allows locking to an external 1 MHz, 5 MHz or 10 MHz input signal in the same manner as the Digital Hold Phase-Locked Loop modules described previously, but it uses the 10 MHz Rubidium Oscillator for improved long-term stability when the

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input is not present. This module requires four slots in the chassis.

Low Noise Input Modules

The Low Noise Wideband Input module provides transformer coupling of the input to the QWB output modules giving very low noise distribution of signals in the 100 kHz to 10 MHz range. This module adds no significant noise or jitter to the input but provides no level control or waveshaping of the input signal. A second version is a dual channel module to allow for two input signals while requiring only one slot in the mainframe.

Time Code Input Modules

The Time Code Input module provides AGC of a modulated time code (T/C) input signal with a carrier frequency from 100 Hz to 100 kHz. This may be used with the Time Code Output module for distribution of IRIG, XR3, or other time code signals. A second version has no AGC circuitry and is used for simple distribution of a fixed-level T/C signal to multiple outputs.

Combiner Module

The 10 dB Combiner module provides switching capability between two input signals. This module attenuates the secondary input by 10 dB and then combines the two inputs in a passive hybrid combiner. This outputs the sum of the two signals with the primary input being predominate as long as it is present; the secondary input is available if the primary is lost. The module provides 'hitless' switching when used to drive a synthesizer or PLL module.

Automatic Switchover Modules

The Automatic Switchover modules use relays to switch between the primary and secondary inputs when the selected input level drops below a safe threshold while the alternate input is still present. The different versions of this module provide for inputs and output from the front panel or the bus and switching of single-ended or balanced signals. The remote control versions are the same except that a double width front panel (requiring 2 slots) is used with BNC inputs that allow for controlling the selection of input from an external source. This is useful for switching on an alarm signal from an external device, such as the AUSTRON Model 2110 Disciplined Frequency Standard.

Composite Clock Generator Modules

Composite Clock Generator modules accept either a 1 MHz, 5 MHz, 10 MHz or 1.544 MHz input signal and synthesizes a 64 kHz/8 kHz composite clock signal. This composite clock generator signal is a 64 kHz, return to zero, bipolar AMI (alternate mark inversion) format with a bipolar violation every eighth pulse (8 kHz). The duty cycle is jumper-selectable for either 50/50 or 5/8 duty cycle pulses. The module normally interconnects DS0 circuits to a common clock source. The unit must be used with the Quad Composite Clock Output (CCO) module(s) to generate the required output signals.

Framed T1 Modules

The Framed T1 Generator module accepts a 1.544 MHz clock signal and generates a framed DS-1 signal in the D4 format for output as an AMI bipolar signal through an output module. The Framed T1 Synthesizer module takes a 1 MHz, 1.544 MHz, 5 MHz, or 10 MHz input signal and produces the same output. The input frequency is jumper selected in the module. The output signal of either will have the framing bits plus data bits of either all ones or one bit per channel, also jumper selectable. These modules must be used with center-tapped, transformer-coupled QWB or the G.703 output modules to generate the AMI DS-1 signals.

Clock Recovery Module

The Clock Recovery Module accepts a PCM data line in bipolar AMI format and recovers the clock from it. The unit is set by DIP switches for any frequency in the 1 MHz to 10 MHz range, such as T1, T1E, T2, or CEPT (2.048 MHz). The input is through either a twin-BNC or bantam jack connector on the front panel. Provision is included to select either bridging (1 kilohm) or terminating (100-ohm) input termination. The

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module generates an output clock which is synchronous with the incoming data rate in either bipolar square wave or RS422 format. The output signal is jumpered to a bus or to the front panel.

Digital Fiber Optic Modules

The Digital Fiber Optic Receiver module accepts a signal from a fiber optics cable via a front panel SMA-type optical connector. The signal is conditioned and placed on the bus for distribution, or output through a front panel BNC connector. The Digital Fiber Optic Transmitter module provides an optical output to drive a fiber optics cable with an SMA-type optical connector for isolated and EMI-secure interconnection between areas. The module accepts bus signals from any of the input modules that are available. A second version has a front panel BNC input connector.

OUTPUT MODULES

In addition to the wide variety of input modules available, there are several versions of output modules which may be used in the unit. Each of these contain four individual channel amplifiers with a common input and are designed for analog, digital, composite clock, or time code signal distribution. All output modules, except RS422, include output level monitoring of each channel to give an alarm if any channel drops below a preset threshold. And, other than RS422 and V.35 modules, the output signal levels are individually adjustable.

Quad Wideband Output Modules

The Quad Wideband Output module is the 'workhorse' of the output modules and is available in several versions. The basic module operates over the 100 kHz to 10 MHz band. The module has four low impedance, ac-coupled amplifiers with isolated BNC outputs and can drive a 50-ohm load at up to 3 Vrms with low noise and distortion. A second version extends the low frequency operation of the module down to 1 kHz with only slight performance deterioration over the full range. A third version adds a transformer-coupled output and twin-BNC connectors for full isolation of ground. The fourth version has a grounded center-tap transformer and twin-BNC connectors to give a bipolar differential output. A fifth version uses isolated BNC connectors for outputs. Additional versions provide outputs to wire-wrap posts on a removable connector.

Time Code Output Modules

The Time Code Output module distributes modulated time code signals provided by a Time Code Input module. The outputs are provided on BNC connectors.

Quad RS422 Output Modules

The Quad Output module has four RS422 outputs (differential TTL) on twin-BNC connectors and accepts bus signals from any input module that provides a square wave or RS422 signal. A second version provides outputs on wire-wrap posts.

Composite Clock Output Modules

The Composite Clock Output module is used with the Composite Clock Generator module and provides for distribution of 64 kHz/8 kHz composite clock signals for telecommunications equipment. The module has bantam-type telephone jacks, twin-BNC type connectors, or wire-wrap posts for outputs.

Quad V.35 Output Modules

The Quad V.35 Output module takes square wave signals (1 kHz to 10 MHz) and provides a balanced output signal meeting the CCITT V.35 Appendix II specifications. The module has twin-BNC connectors or wire-wrap posts for the outputs.

Quad G.703 Output Modules

The Quad G.703 Output module provides telecommunication clock signals complying with the CCITT G.703 specifications for 1.544 MHz, 2.048 MHz and 6.312 MHz. The module provides square wave or bipolar AMI signals with individual output level controls and drives single-ended coaxial cables with BNC connectors or balanced, twisted-pair cables with wire-wrap or twin-BNC connectors.

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High Isolation Output Modules

High Isolation Output modules provide for distribution of signals with very high isolation between outputs and a very low phase-noise contribution. Very high isolation is provided both output- to-input and channel-to-channel. The low phase-noise contribution allows distribution of very quiet reference signals while maintaining a low phase-noise floor. Output is through SMA-type coaxial connectors.

ORDERING YOUR MODEL 1295D SYSTEM

The following foldout is a guide to enable you to make your requirement decisions and layout your distribution system. Just follow the procedure as it is presented to find your total system requirements. An example system is laid out in the center of the following page. The layout includes a block diagram and configuration sheet to assist you in configuring and laying out your system. The modules listed on the reverse of the fold out include the majority of modules available. Contact your AUSTRON sales representative for versions not listed here.

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A Few Notes . . .

When configuring the complement of modules f your Model 1295D keep in mind the followi guidelines:

- Allow only one signal per bus, maximum of five busses.
- Terminate all busses with the jumpers provided on the interconnect board except when using V.35 or RS422 output modules.
- All scalers, buffers, synthesizers require an output module of some kind, (i.e., Quad Wideband Output or Quad RS422 Output).
- Use only the V.35, G.703, TTL or RS422 Output Modules with RS422 synthesizers.
- All Time Code Input Modules require matching Time Code Output Modules. Clock Recovery Modules require AMI-type format input from 1 MHZ to 10 MHZ.
- Framed T1 Synthesizer and Composite Clock Generator Modules can use a 1 MHz, 5 MHz or 10 MHz input as well as a 1.544 MHz input.
- Composite Clock Generator Modules require Composite Clock Output Modules.
- Phase-Locked Loop Modules are generally designe to be used as a backup frequency source for an exte nal reference.
- Use no more than two Rubidium Phase-Locked Lo Modules or two Digital Hold Phase-Locked Loop Modules in one mainframe configuration.
- When adding Automatic Switchover Modules, note that they are available with either front panel or bus inputs and outputs. Use these options in selecting c nections to maximize use of : vailable busses.

To Get Started . . .

1. Establish the input and output signals you ne both the type or function of the signal and the qua tity.

2. The Model 1295D has 5 signal busses and 11 I slots, so the number of signals and modules requi determines how many mainframes you need.

3. Some modules use more than 1 slot, this also fects the number of units required; at this time modules use from 1 to 4 slots.

4. The tables on the reverse of this page list modules divided by function including part numb description, and I/O connector information. Cho the modules needed.

5. Begin filling out the blocks in the last column this page. When completed, you can find the t number of modules and busses your system ne and the total quantity of mainframes needed.

6. Now you are ready to complete your configu tion sheet at the back of this brochure. Refer to completed example configuration sheet in the ce of this fold-out with its basic block diagram when ing out your configuration sheet.

*POWER REQUIREMENTS				
	120Vac/ 220 Vac	20 Vdc to 57 Vdc	Regulator Single/Dual	dc Ground Pos./Neg./Floating
ac				
ac/dc				
dc-only				
*Up to a maximum of 100 W for a full configuration.				

INPUT MODULE REQUIREMENTS				
Function/Frequency	No. of Signals	No. of Modules	No. of Slots	Connector Types

OUTPUT MODULE REQUIREMENTS				
Function/Frequency	No. of Signals	No of Modules	No. of Slots	Connector Types

MAINFRAMES			
Part Number	Power	Regulator	dc Ground
30411392	ac/dc	Single	Floating
30411392-1	dual dc	Single	Negative
30411392-2	ac/dc	Dual	Floating
30411392-3	dual dc	Dual	Negative
30411392-4	dual dc	Single	Positive
30411392-5	dual dc	Dual	Positive

EXTRA POWER/REGULATOR/ALARM MODULES FOR MAINFRAMES	
PART NUMBER	DESCRIPTION
23411342	Regulator
23411350	AC/DC Power Input
23411355	DC-Only Power Input, Negative Ground
23411355-1	DC-Only Power Input, Positive Ground
10911487	Alarm Indicator Assembly
10911847-1	Alarm Indicator Assembly for Dual Supply

High Isolation Output Modules

High Isolation Output modules provide for distribution of signals with very high isolation between outputs and a very low phase-noise contribution. Very high isolation is provided both output- to-input and channel-to-channel. The low phase-noise contribution allows distribution of very quiet reference signals while maintaining a low phase-noise floor. Output is through SMA-type coaxial connectors.

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A Few Notes...

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- All Time Code Input Modules require matching Time Code Output Modules. Clock Recovery Modules require AMI-type format input from 1 MHZ to 10 MHZ.
- Framed T1 Synthesizer and Composite Clock Generator Modules can use a 1 MHz, 5 MHz or 10 MHz input as well as a 1.544 MHz input.
- Composite Clock Generator Modules require Composite Clock Output Modules.
- Phase-Locked Loop Modules are generally designed to be used as a backup frequency source for an external reference.
- Use no more than two Rubidium Phase-Locked Loop Modules or two Digital Hold Phase-Locked Loop Modules in one mainframe configuration.
- When adding Automatic Switchover Modules, note that they are available with either front panel or bus inputs and outputs. Use these options in selecting connections to maximize use of available busses.

To Get Started...

1. Establish the input and output signals you need, both the type or function of the signal and the quantity.

2. The Model 1295D has 5 signal busses and 11 I/O slots, so the number of signals and modules required determines how many mainframes you need.

3. Some modules use more than 1 slot, this also effects the number of units required; at this time our modules use from 1 to 4 slots.

4. The tables on the reverse of this page list the modules divided by function including part number, description, and I/O connector information. Choose the modules needed.

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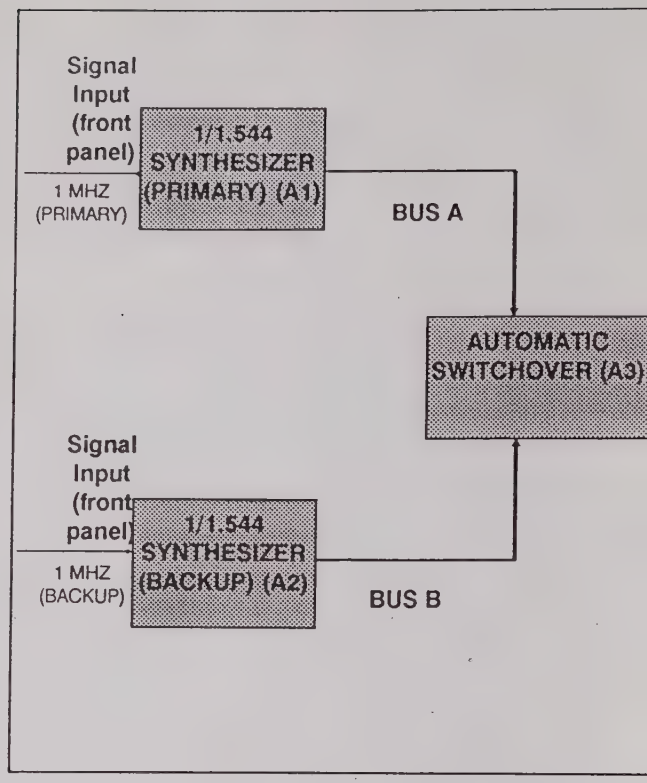

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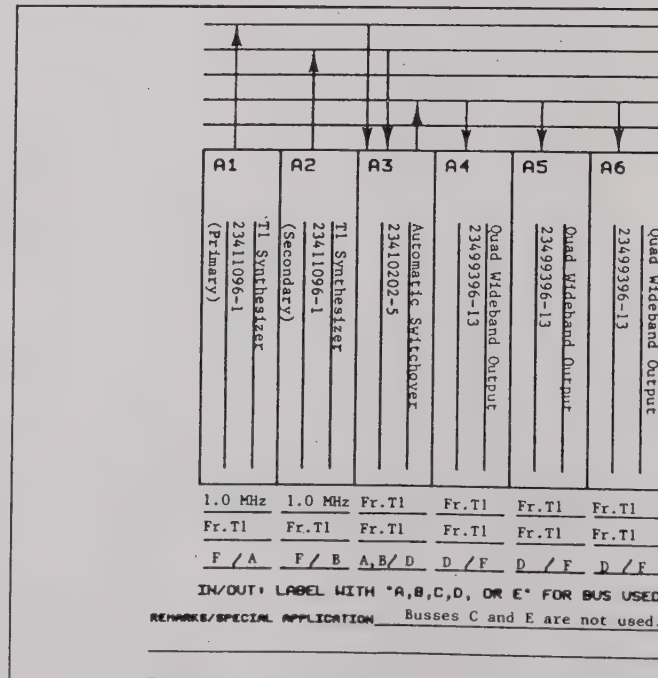

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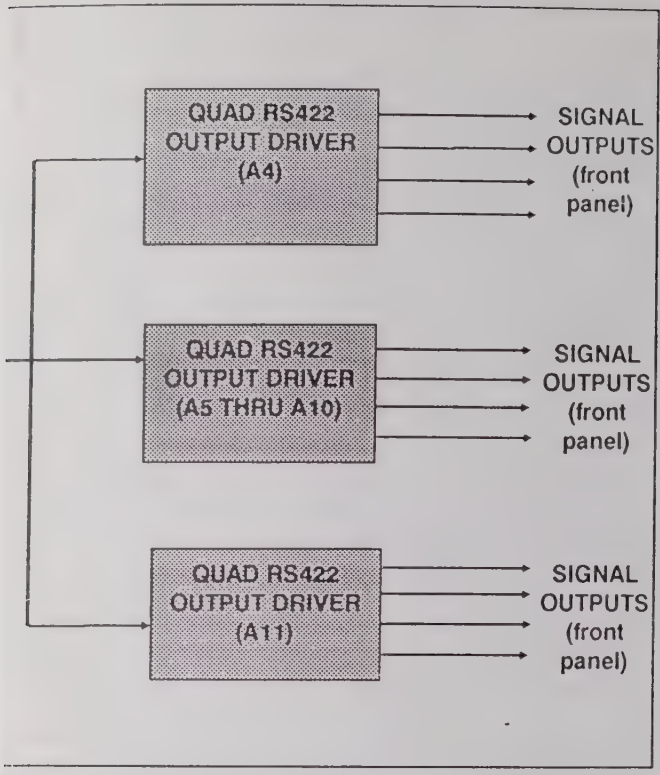
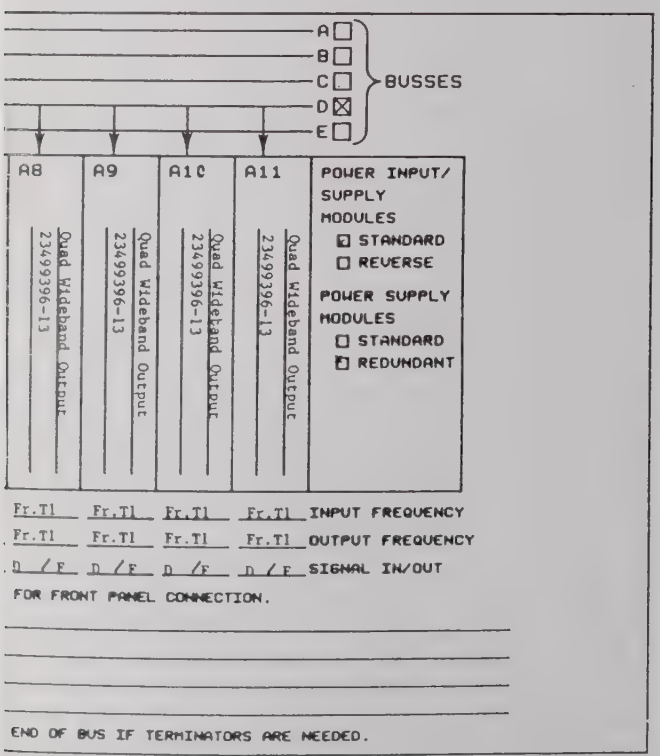


TION CHASSIS BLOCK DIAGRAM
RATION SHEET SHOWN BELOW.



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*Up to a maximum of 100 W for a full configuration.				

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Function/Frequency	No. of Signals	No. of Modules	No. of Slots	Connector Types

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30411392-3	dual dc	Dual	Negative
30411392-4	dual dc	Single	Positive
30411392-5	dual dc	Dual	Positive

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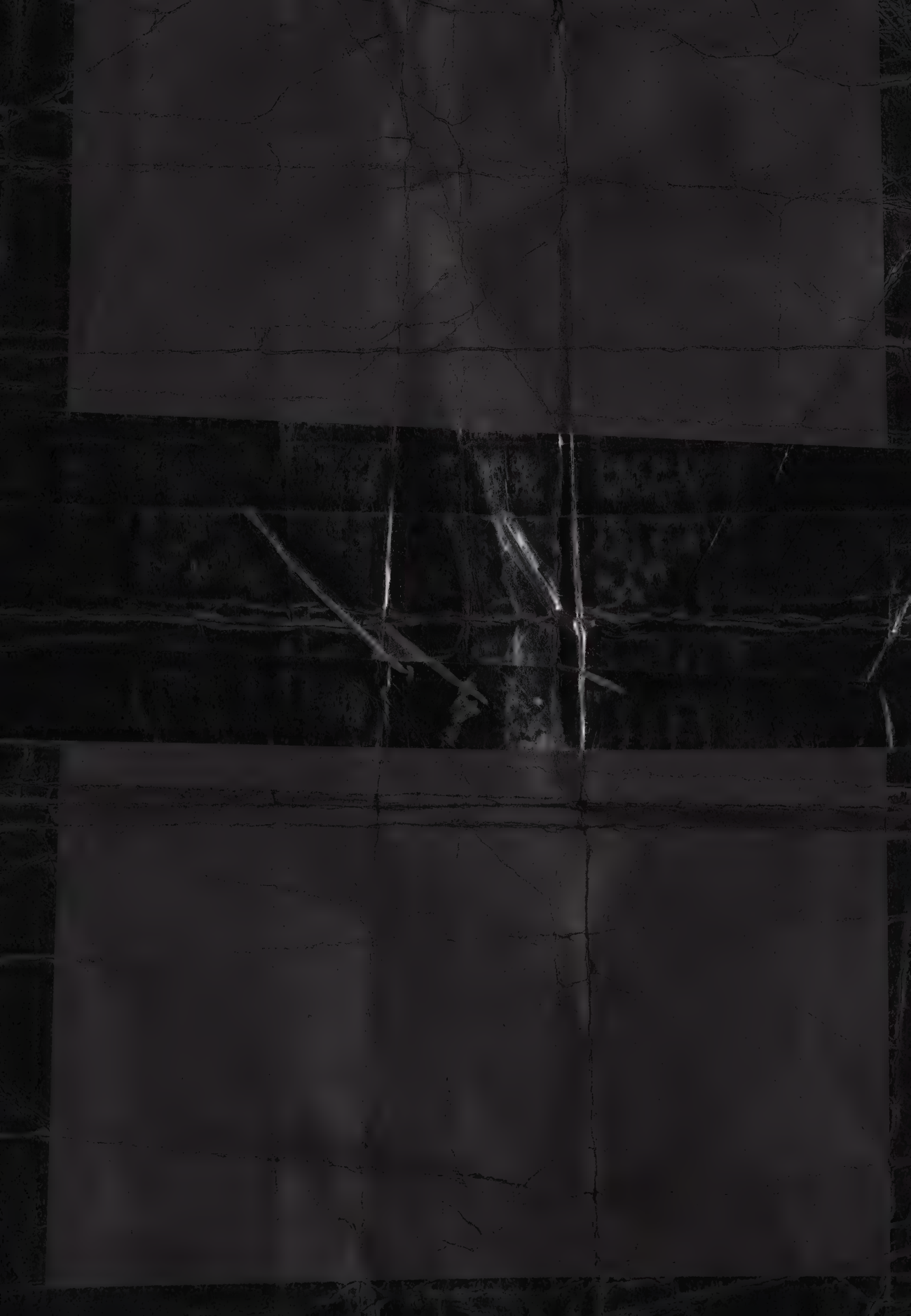
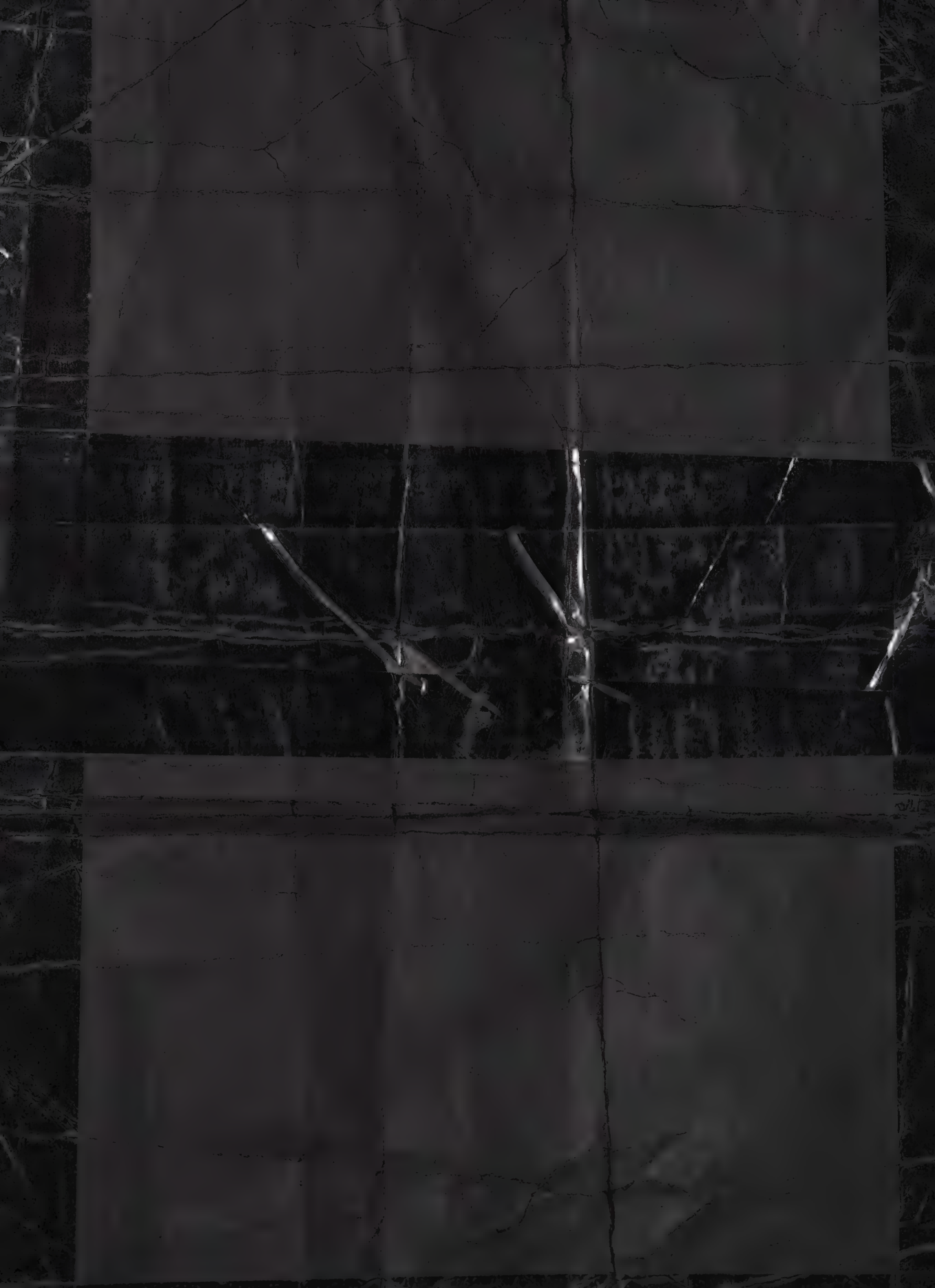
10911847-1	Alarm Indicator Assembly for Dual Supply





INPUT MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/O
23498935	Low Noise Wideband	BNC/Bus
23498935-1	Dual Low Noise Wideband	BNC(2)/Bus(2)
23499757	Time Code with AGC	BNC/Bus
23499757-1	Time Code without AGC	BNC/Bus
23499880	10 dB Combiner	BNC/BNC

FILTER MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/O
23410127	Sine Filter, 564 kHz	Bus/Bus
23410127-1	Sine Filter, 308 kHz	Bus/Bus

FIBER OPTIC MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/O
23411259	Digital F/O Transmitter	Bus/SMA-type
23411259-1	Digital F/O Transmitter	BNC/SMA-type
23411261	Digital F/O Receiver	SMA-type/Bus
23411261-1	Digital F/O Receiver	SMA-type/BNC

CLOCK RECOVERY MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/C
23411078	Clock Recovery	Bantam/Bus
23411078-1	Clock Recovery	Bantam/BNC
23411078-2	Clock Recovery	Bantam/Bantam
23411078-3	Clock Recovery	Twin - BNC/Bus
23411078-4	Clock Recovery	TwinBNC/TwinBNC
23411078-5	Clock Recovery	Twin - BNC/BNC
23411078-6	Clock Recovery	Bridged Bantams
23411078-7	Clock Recovery	Bridged Twin BNC

GENERATOR/T1 SYNTHESIZER MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/O
23410947	Composite Clock Generator	Bus/Bus
23410947-1	Composite Clock Generator	BNC/Bus
23410947-2	Composite Clock Generator	Twin - BNC/BNC
23411072	Framed T1 Generator	Bantam/Bus
23411072-1	Framed T1 Generator	BNC/Bus
23411072-2	Framed T1 Generator	Twin - BNC/Bus
23411072-3	Framed T1 Generator	Bus/Bus
23411096	Framed T1 Synth: 1,5,10,T1/1.544	Bantam/Bus
23411096-1	Framed T1 Synth: 1,5,10,T1/1.544	BNC/Bus
23411096-2	Framed T1 Synth: 1,5,10,T1/1.544	Twin - BNC/Bus
234110936	Framed T1 Synth: 1,5,10,T1/1.544	Bus/Bus
23411106	T1 Synth: 1,5,10,/6.312	BNC/Bus

AUTOMATIC SWITCHOVER MODULES

PART NUMBER	DESCRIPTION	CONNECTOR I/C
23410202	Automatic Switchover	BNC/BNC
23410202-1	Automatic Switchover	BNC/Bus
23410202-2	Automatic Switchover	Bus/Bus
23410202-3	Automatic Switchover	Bus/BNC
23410202-4	Automatic Switchover	TwinBNC/TwinBN
23410202-5	Automatic Switchover	Bus/Bus
23410202-6	Automatic Switchover	Twin BNC/Bus
23410202-7	Automatic Switchover	Bus/Twin - BNC
23410836	Remote Auto Switch 2 Slots	BNC/BNC
23410836-1	Remote Auto Switch 2 Slots	BNC/Bus
23410836-2	Remote Auto Switch 2 Slots	Bus/Bus
23410836-3	Remote Auto Switch 2 Slots	Bus/BNC
23410836-4	Remote Auto Switch 2 Slots	TwinBNC/TwinBN
23410836-5	Remote Auto Switch 2 Slots	Bus/Bus
23410836-6	Remote Auto Switch 2 Slots	Twin - BNC/Bus
23410836-7	Remote Auto Switch 2 Slots	Bus/Twin - BNC

SCALER/BUFFER MODULES

PART NUMBER	DESCRIPTION	*FREQUENCY I/C
23498612	Buffer	1.544/1.544
23498778	Buffer	5/5
23498870	Buffer	10/10
23498774	Buffer	1/1
23498619	Dual Buffer	5 & 1/5 & 1
23498661	Dual Buffer	10 & 1/10 & 1
23498217	Scaler	1/0.1
23498874	Scaler	10/1
23498878	Scaler	1/1 kHz
23498886	Scaler	10/10 & 1
23410478	Scaler	10/5
23411444	Scaler	1/2
23498441	Scaler/Buffer	5/5 & 1
23498448	Scaler/Buffer	5/10 & 5
23498644	Scaler/Buffer	5/10 & 1

*All frequencies are MHz unless otherwise noted. All inputs are BNC, all outputs are bus.

OSCILLATOR/ PHASE-LOCKED LOOP (PLL) MODULES

PART NUMBER	DESCRIPTION	CONNECTORS I/O
23411532	10 MHz Dig'l Hold PLL 3slots	Bus or BNC
23411532-1	5 MHz Dig'l Hold PLL 3slots	Bus or BNC
23411532-2	6.312 MHz Dig'l Hold PLL 3slots	Bus or BNC
23411419	10 MHz Rb Reference 3slots	Bus or BNC
23411549	10 MHz Dig'l Hold PLL Osc. 4slots	Bus or BNC

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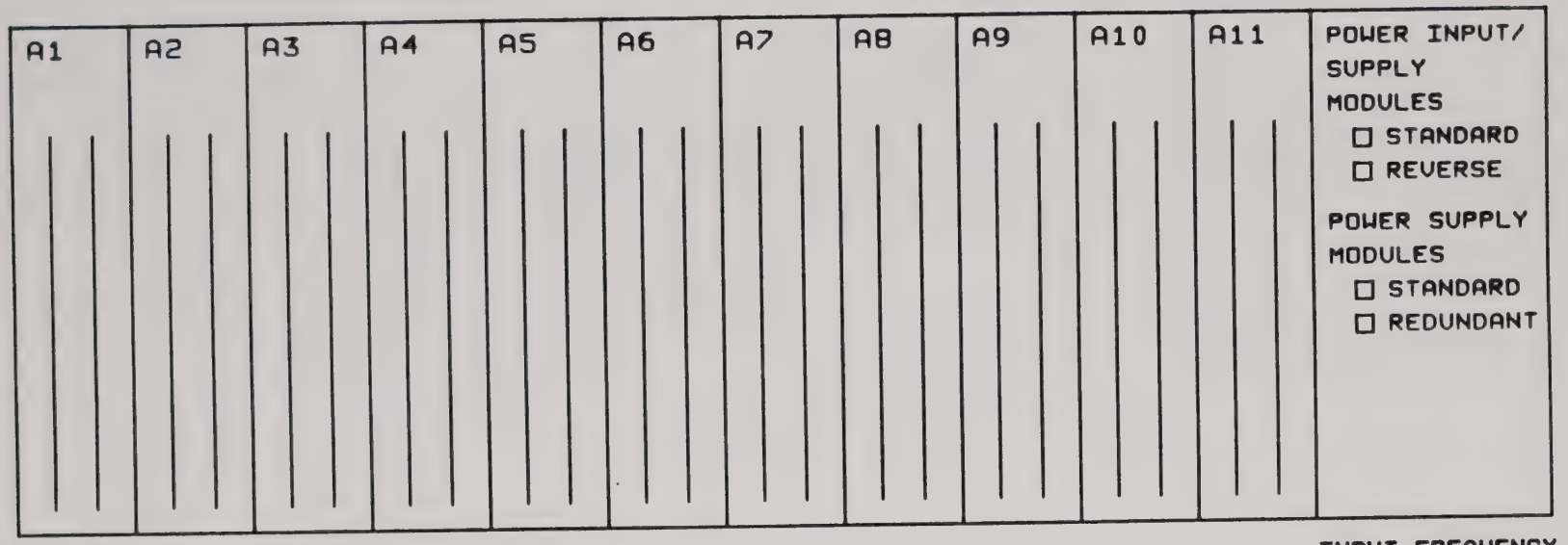
1295D INTERCONNECT TABLE
25411393-____
BACKPLANE

SALES ORDER _____ PREPARED BY _____

CUSTOMER _____ DATE _____

A ☐
B ☐
C ☐ } BUSSES
D ☐
E ☐



_____ INPUT FREQUENCY

_____ OUTPUT FREQUENCY

_____ SIGNAL IN/OUT

IN/OUT: LABEL WITH "A,B,C,D, OR E" FOR BUS USED, OR "F" FOR FRONT PANEL CONNECTION.

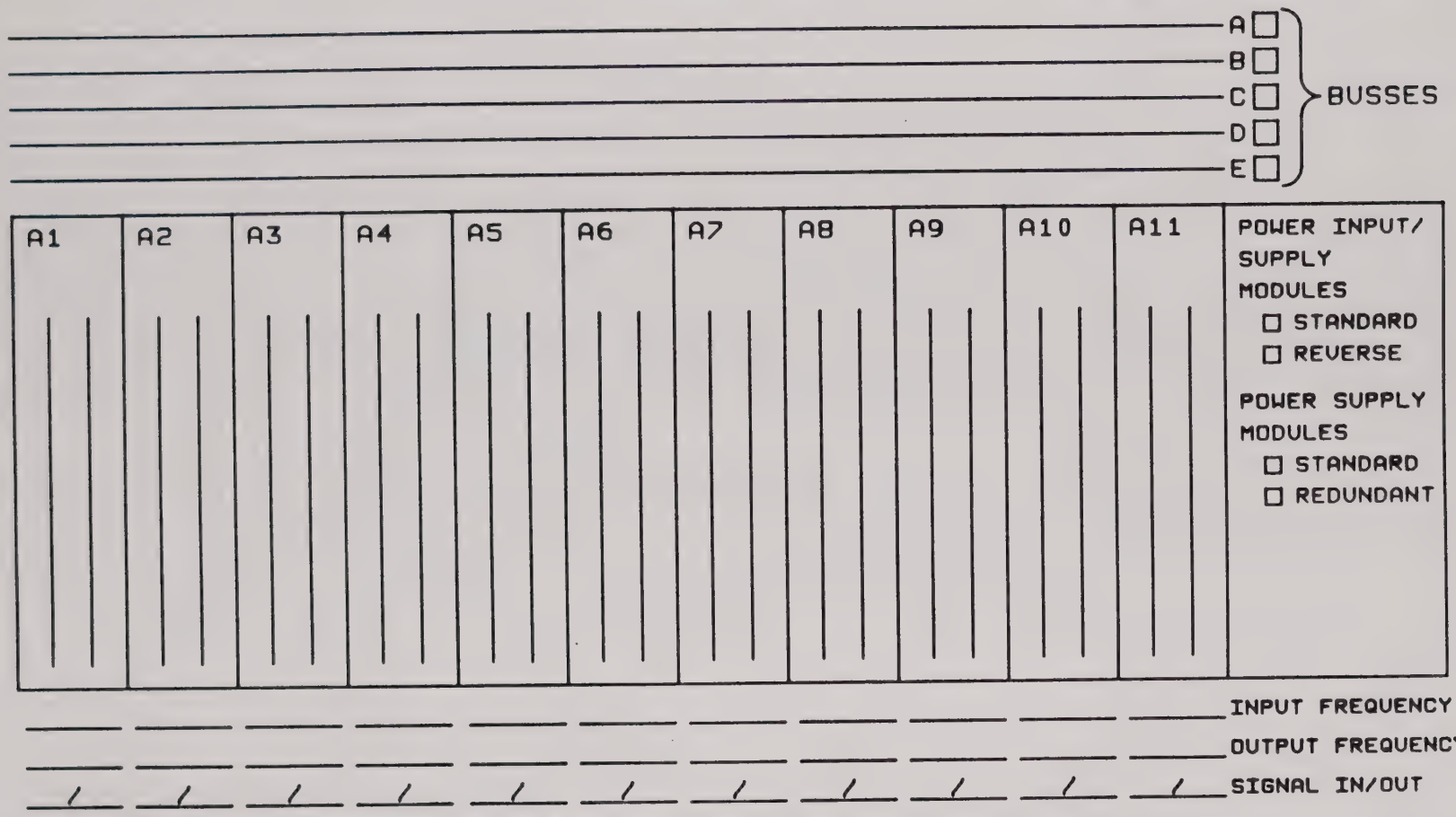
REMARKS/SPECIAL APPLICATION _____

CONFIGURED BY _____ DATE _____ NOTE: PLACE AN "X" IN BOX AT END OF BUS IF TERMINATORS ARE NEEDED.

1295D INTERCONNECT TABLE
25411393-_____
BACKPLANE

SALES ORDER _____ PREPARED BY _____

CUSTOMER _____ DATE _____



IN/OUT: LABEL WITH "A,B,C,D, OR E" FOR BUS USED, OR "F" FOR FRONT PANEL CONNECTION.

REMARKS/SPECIAL APPLICATION _____

CONFIGURED BY _____ DATE _____ NOTE: PLACE AN "X" IN BOX AT END OF BUS IF TERMINATORS ARE NEEDED.

1295D INTERCONNECT TABLE
25411393-_____
BACKPLANE

SALES ORDER _____ PREPARED BY _____

CUSTOMER _____ DATE _____

A ☐
B ☐
C ☐ } BUSSES
D ☐
E ☐

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	POWER INPUT/ SUPPLY MODULES ☐ STANDARD ☐ REVERSE POWER SUPPLY MODULES ☐ STANDARD ☐ REDUNDANT
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	INPUT FREQUENCY
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	OUTPUT FREQUENCY
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	SIGNAL IN/OUT

IN/OUT: LABEL WITH "A,B,C,D, OR E" FOR BUS USED, OR "F" FOR FRONT PANEL CONNECTION.

REMARKS/SPECIAL APPLICATION _____

CONFIGURED BY _____ DATE _____ NOTE: PLACE AN "X" IN BOX AT END OF BUS IF TERMINATORS ARE NEEDED.

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MODEL 1295D MODULES

QUAD HI/LO BUFFER MODULE

GENERAL DESCRIPTION

The **QUAD HI/LO BUFFER Module** is used with the Model 1295D Distribution Chassis Series. This high isolation, low phase noise buffer provides four outputs isolated from each other and from their input signal with minimum additional phase noise. The input can be for one module, or the I/O module can be jumpered to the bus to utilize other Isolation Output modules.

SPECIFICATIONS

Input

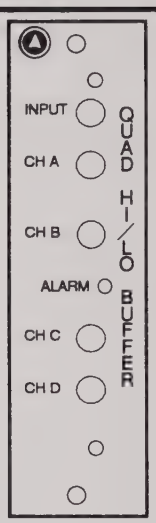
Level:	1 Vrms sinewave nominal
Type:	Balanced bus input or SMA
Impedance:	50 Ω SMA, or 10 kΩ balanced bus
Frequency:	100 kHz to 20 MHz

Output

Level:	1 Vrms sinewave nominal
Type:	Unbalanced, SMA
Impedance:	50 Ω
Frequency:	100 kHz to 20 MHz
Harmonics:	< -40 dBc
Alarm:	LED for all channels, Bus connection for chassis ALARM
Spurious Frequencies:	< -110 dBc
Phase Noise:	@ 5 MHz (10 MHz is degregated by 6 dBC) < -135 dBc/Hz @ 1 Hz from carrier < -145 dBc/Hz @ 10 Hz from carrier < -155 dBc/Hz @ 100 Hz from carrier < -160 dBc/Hz @ 1 kHz from carrier < -160 dBc/Hz @ 10 kHz from carrier
Front-to-Back Isolation:	< -105 dBc for 5 MHz & 10 MHz @ 1 Vrms input
Port to Port Isolation:	< -95 dBc for 5 MHz @ 1 Vrms input < -75 dBc for 10 MHz @1Vrms input
Short to Open on another port:	< 4 picoseconds phase shift @ 5 MHz input.

GENERAL

Power consumption:	< 3 W
Operating temperature:	0°C to 50°C
Humidity:	95% without condensation
Altitude:	To 30,000 ft. (9,144 m)



QUAD HI/LO BUFFER

APPLICATIONS

- Used when ultimate signal isolation and extremely low phase noise are the highest priority.

FEATURES

- Bus or Front Panel Input
- 4 outputs
- SMA-type connectors or bus output
- LED indicates ALARM condition
- Wide Bandwidth

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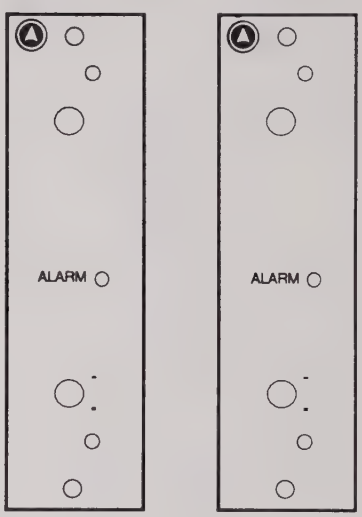
MODEL 1295D MODULES

ANALOG FIBER OPTIC TRANSMITTER and RECEIVER MODULE



ANALOG FIBER OPTIC TRANSMITTER and RECEIVER MODULE

GENERAL DESCRIPTION

The ANALOG FIBER OPTIC TRANSMITTER and RECEIVER MODULES are used in the versatile 1295D Distribution Chassis. They allow for distribution of wide band analog signals to be distributed from chassis to chassis over a Fiber Optic Link. The modules can be used in conjunction with a variety of 1295D modules.

SPECIFICATIONS

TRANSMITTER MODULE

Front Panel Input:	
Level:	1 Vpp min., 3 Vpp max.(1.)
Load:	1 M Ω nominal
	620 Ω jumperable
	51 Ω jumperable
Bus Input:	
Level:	1 Vpp max. (1.)

Receiver Module

Front Panel Output:	
Level:	Adjustable to Transmitter input level
Load:	50 Ω
Bus Output:	
Level:	≤ 1 Vpp
Harmonics:	< -40 dBc

GENERAL

Fiber Optics:	
Wavelength:	820 nm
Power:	9 dB nominal (1.)
Cable Length:	1km max. w/100/140 cable
Frequency Range:	100 Hz to 10 MHz
Power Consumption:	< 1 W
Operating temperature:	0°C to 50°C
Humidity:	95% without condensation
Altitude:	To 30,000 ft. (9,144m)

(1.) When driving above this rating, it will experience non-linear effects

APPLICATIONS

- High security distribution
- Non-metal cabling
- Time Code, Time and Frequency

FEATURES

- Front Panel or Bus I/O
- SMA style Fiber Optic connection
- ALARM condition indicator
- Can be interfaced with a multitude of 1295D modules

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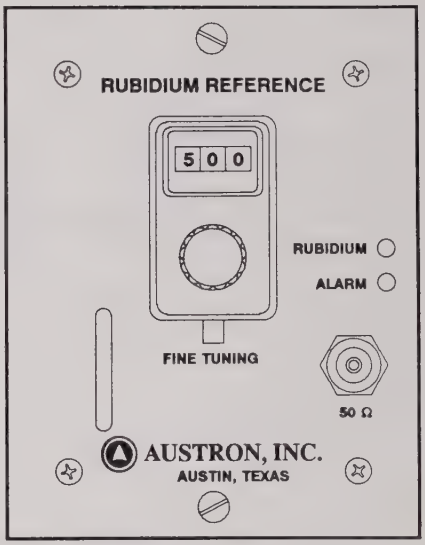
MODEL 1295D MODULES

RUBIDIUM REFERENCE MODULE



GENERAL DESCRIPTION

The **Rubidium Reference Module** is an optional internal reference for the AUSTRON Model 1295 Distribution Chassis. It provides a stable 10 MHz reference signal. The Rubidium Reference Module has adjustable frequency by a means of vernier control on the front panel.

SPECIFICATIONS

Output: 10 MHz sine wave, 0.5 Vrms ± 10% into 50 W

Mechanical tuning: $\geq \pm 1 \times 10^{-9}$

Long term drift rate: $\leq 5 \times 10^{-11}$ / month, after 1 month continuous operation

Phase noise:

	10 MHz
10 Hz	-85 dB
100 Hz	-110 dB
1 kHz	-125 dB
10 kHz	-130 dB

Short Term Stability:

1 second	1×10^{-10}
10 second	3×10^{-11}
100 second	1×10^{-11}

Frequency vs temperature: $< 3 \times 10^{-10}$ 0°C to 50°C

GENERAL

Power consumption:	10 W @ 24 Vdc
Operating temperature	0°C to 50°C
Humidity:	95 % without condensation
Altitude:	30,000 ft. (9,144 m) maximum

APPLICATIONS

- Precision Source for reference signal distribution
- Precision Source for Telecom clock signals

FEATURES

- Adjustable low drift reference signal
- Alarm status indicators
- Frequency adjust control
- 50 Ω output jack
- Optional Bus output

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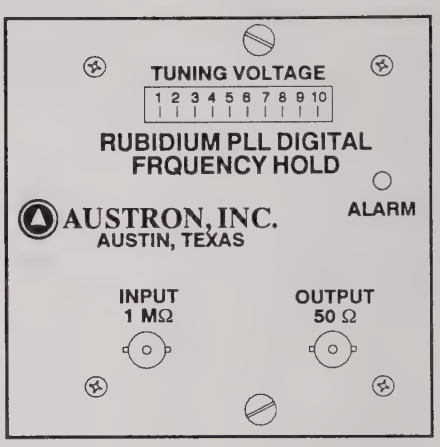
MODEL 1295D MODULES

RUBIDIUM PLL MODULE



GENERAL DESCRIPTION

The **Rubidium PLL Module** is an optional secondary internal reference for the AUSTRON 1295D Distribution Chassis. It provides a 10 MHz reference which is phase locked to an external reference. The Rubidium PLL Module will continue to freewheel and provide a reference signal after the loss or removal of the external reference.

The **Rubidium PLL Module** utilizes phase-locked loop circuitry with digital memory to apply the electronic tuning (ET) voltage to the Rubidium oscillator. The digital ET memory holds the long-term stable rubidium oscillator to within parts in 10^{-11} of the reference in the event of reference failure or removal. If the module is powered on without a reference, the ET will initialize at 5 volts and the oscillator will warm up to its normal frequency.

SPECIFICATIONS

External Reference Input

Level:	0.5 to 5 Vrms
Input Impedance:	1 M Ω
Frequency:	1 MHz, 5 MHz or 10 MHz jumper selectable

Rubidium Oscillator

Output:	10 MHz 0.5 Vrms ± 10 %
Mechanical Tuning:	$\pm 1 \times 10^{-9}$ min.
Free running drift rate:	2×10^{-12} / Day, @ 30 days continous operation 4×10^{-11} /Day, @ 1 hour continous operation @ 25°C
Phase Noise:	
10 Hz	-85 dB
100 Hz	-110 dB
1 kHz	-125 dB
10 kHz	-130 dB
Free running accuracy over temperature:	2×10^{-10}, 0°C to 37°C ambient
Short Term Stability:	
1 second	1×10^{-10}
10 second	3×10^{-11}
100 second	1×10^{-11}

APPLICATIONS

- Secondary Refernce to provide backup to remote Primary Reference
- Telecom "Dejitterizing" with Stratum II accuracy

FEATURES

- Front Panel Input and Output plus optional Bus Output
- Alarm condition Indicator
  Green (normal)
  Red (failed or removed reference)

GENERAL

Power consumption:	24 Vdc, 10 W @ 25°C 12 Vdc, 1 W -12 Vdc, 0.5 W
Operating temperature:	0°C to 37°C
Humidity:	95% noncondensing
Altitude:	30,000 ft. (9.144 m) max.
Phase-locked Loop:	
Loop type:	Type II (two integrations)
Loop bandwidth:	Approximately 0.25 Hz
Capture range:	$\pm 2 \times 10^{-9}$
Digital tuning voltage hold resolution:	Approximately 1.6×10^{-12}

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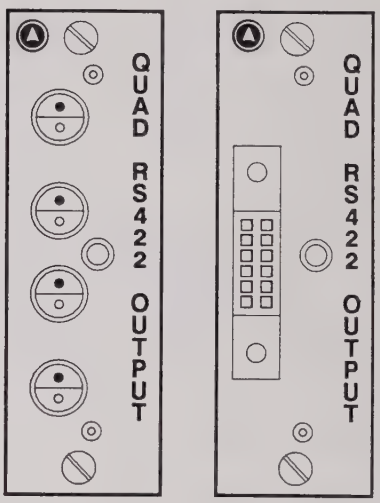
MODEL 1295D MODULES

QUAD RS422 OUTPUT MODULE



GENERAL DESCRIPTION

The **QUAD RS422 OUTPUT MODULE** is used with the 1295D Distribution Chassis Series. The signal from the backplane is buffered and passed through four identical RS422 drivers. This design also employs a low input indicator. This module has four RS422 outputs on twin-BNC connectors or wire wrap terminals and accepts bus signals from any of the input modules that provide a square wave or RS422 signal.

SPECIFICATIONS

INPUT

	Standard RS422 Levels
Level :	- 12 Vdc to 12 Vdc (max.)
Threshold :	-0.2 Vdc to 0.2 Vdc (min.)
Resistance :	≥ 4 kΩ

Output

	Standard RS422 Levels
Unloaded :	6 Vdc between outputs (max.)
Loaded :	2 Vdc between outputs (min.)
Maximum Data Rate :	10 M Baud
Short Circuit Current :	150 mA maximum
Alarm :	Red LED for low or lost input

GENERAL

Power Consumption :	Less than 2 W
Operating Temperature :	0°C to 50°C
Humidity :	95 % without condensation
Altitude :	To 30,000 ft. (9,144 m)

APPLICATIONS

- Telecommunications Clock Signal Distribution
- Digital Interface

FEATURES

- 4 Outputs per module
- LED indicates Alarm condition
- Removable wire wrap connector

OPTIONS

23410140	Twin BNC connectors
23410140-1	Wire wrap connector

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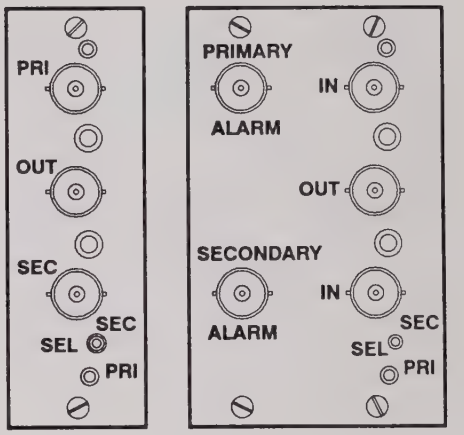
MODEL 1295D MODULES

AUTOMATIC SWITCHOVER MODULE



GENERAL DESCRIPTION

The **Automatic Switchover Module** is used with the Austron 1295D Distribution Chassis. The Automatic Swichover Module selects one of two input signals and passes the one selected to the output of the module. The input may be selected manually if both inputs are available. If one of the inputs are lost, the module automatically selects the available input. The module accepts the input from the backplane or through the front panel connectors. The output is fed to the front panel or to the backplane. Status LEDs indicate which input is selected and/or the loss of an input. The remote control versions of the module allows selection of input by control signals input on the additional BNC connectors.

SPECIFICATIONS

INPUT:	Standard Model 1295 Bus signal or BNC connectors
Level:	From 500 mV_{p-p} to 3 Vrms differential pair or single ended depending on application
Frequency:	400 Hz to 15 MHz
OUTPUT:	Standard Model 1295 Bus signal or BNC connector
Level:	Same as input level
Selection:	Manual, automatic (on loss of selected input) or through optional remote control

POWER

Power Consumption:	Under 1 W

ENVIRONMENT

Operating Temperature:	0°C to 50°C
Storage Temperature:	-40°C to 70°C
Humidity:	95% without condensation
Altitude:	Up to 30,000 ft. (9,144 m)

APPLICATIONS

- Fail-safe systems requiring continuous signal input
- Manual or remote selection of inputs

FEATURES

- Automatic switching on loss of signal
- Optional remote control for external alarm conditions (signal source failure or running off frequency)
- Two front panel LEDs indicating input status and

OPTIONS

- Remote Control
- Balanced or single ended
- Front or Bus I/O

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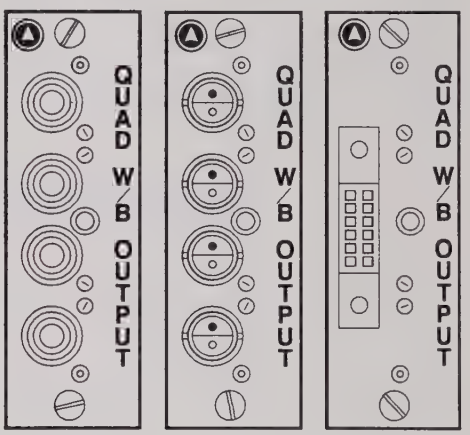
MODEL 1295D MODULES

QUAD WIDEBAND AMPLIFIER MODULE



GENERAL DESCRIPTION

The **Quad Wideband Amplifier Module** is the standard output module for the AUSTRON Model 1295D Distribution Amplifier. The signal from the backplane is amplified through four identical wideband amplifiers with individual amplitude adjustments and a low output indicator.

There are six variations of the Quad Wideband Output module. The basic module operates over the 100 kHz to 10 MHz band and has four, low impedance, ac-coupled amplifiers with isolated BNC outputs and is capable of driving 50-ohm loads at up to 3Vrms with low noise and distortion.

SPECIFICATIONS

Input

Level:	Standard Model 1295 Bus Signal
Bias:	From 700 mV_{p-p} to 1 V_{p-p}, depending on frequency
	6 Vdc

Differential Pair

Frequency:	0.1 MHz to 10 MHz (1 kHz optional)

Output

Level:	Continuously adjustable from 0.4 to 3 Vrms into a 50 Ω load
Frequency:	0.1 MHz to 10 MHz (1 kHz optional)
Harmonic Distortion	Down more than 40 dBC at 1 Vrms
	Down more than 35 dBC over 1 Vrms
Nonharmonic Distortion:	Down more than 60 dBC from 1 Vrms output
Channel Isolation:	Greater than 50 dBC
	Amplitude ± 1.0 %
As a function of load on any channel (i.e., shorted to open)	Phase @ 10 MHz, 5MHz $\pm 0.1 \times 10^{-9}$ sec
	@ 1 MHz $\pm \times 10^{-9}$ sec
	@ 100 kHz $\pm 5 \times 10^{-9}$ sec
Alarm Indicator:	Red LED for low or lost output

GENERAL

Power Consumption:	Less than 6 W
Operating temperature:	0°C to 50°C
Humidity:	95 % without condensation
Altitude:	To 30,000 ft. (9,144 m)

APPLICATIONS

- Reference Signal Distribution
- Drive up to 1,000' of coax

FEATURES

- 4 Individually Adjustable outputs
- LED indicates Alarm condition
- Single Ended or Balanced outputs

OPTIONS

23499396	Standard
23499396-1	1kHz to 10 MHz
23499396-2	Xmfr coupled, twin BNC
23499396-3	Xmfr coupled, center-tap
23499396-4	Xmfr coupled, BNC
23499396-10	Standard, WW output
23499396-12	-2 with WW output
23499396-13	-3 with WW output

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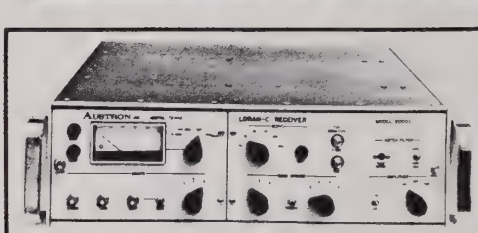
MODEL 2000C



LORAN-C RECEIVER

GENERAL

The Austron Model 2000C Loran-C Receiver receives and phase-tracks Loran-C signals for time and frequency calibration and control, propagation study, and other purposes. When used to monitor the Loran-C groundwave, the Model 2000C permits time epoch determinations of sub-microsecond accuracy. Frequency measurements with an accuracy of one or two parts in 10^{12} are possible with one-day averaging.

SPECIFICATIONS

ELECTRICAL

Frequency Standard Input:
1 MHz $\pm 1 \times 10^{-7}$; 1 to 10 Vrms into 600 ohms, sine or square wave.

Time Reference Input:
1 Hz synchronized to within 10 ms of UTC.

RF:
Frequency—100 kHz.
Sensitivity—10 nanovolts rms into 50 ohms at tracking point.
Bandwidth—20 kHz or 50 kHz in tracking channel, switch selected; 5 kHz (nominal) in acquisition channel.
Gain controls—Adjustable from zero to 99 db in one db steps.

Group Repetition Period Synthesizer:
Manually adjustable internal preset counter generates repetition periods in 100 microsecond steps from 10,000 microseconds to 109,900 microseconds.

Major Outputs:
1. 1 Hz, 1 MHz, 100 kHz, 10 kHz, and 1 kHz square waves phase coherent to the received Loran-C signal.
2. Time-of-Coincidence pulse (one second duration).
3. Phase comparison: standard frequency input phase vs. Loran-C signal phase; output suitable for driving an external recorder; 10 microseconds and 100 microseconds full scale; 1 mA into 2000 ohms; phase linearity and resolution sufficient to assure better than 100 nanosecond reading precision.
4. Signal strobe output provides a slow-scanned average Loran-C waveform voltage suitable for driving an external stripchart recorder, as an aid in signal acquisition and cycle identification.
5. Monitor scope outputs (vertical, trigger and Z-axis).

Power:
Line—115 or 230 Vac ±15%, 48-420 Hz, 25 VA.
Standby—22-32 Vdc, 0.7 amp., nominal.

PHYSICAL

Dimensions:
17 x 16½ x 5¼ inches (43.2 x 41.9 x 13.3 cm)

Weight:
Approximately 24 lbs. (10.9 kg)

Mounting:
Adapters supplied for standard 19 inch rack mounting.

Accessories Included:
Power cord, extender cards, spare fuses and bulbs, tuning wand, mating connector, and technical manual.

APPLICATIONS

- ☐ Frequency calibration and control.
- ☐ Time measurements directly traceable to the National Bureau of Standards (NBS), the United States Naval Observatory (USNO) and the International Bureau of the Hour (BIH).
- ☐ Propagation study.

FEATURES

- ☐ Built-in Time-of-Coincidence (TOC) Monitor.
- ☐ Simple, straightforward signal acquisition.
- ☐ Direct self-calibrating cycle identification.
- ☐ Reliable tracking under extreme atmospheric noise or crossrate interference conditions.
- ☐ Protection of vital controls from accidental or inadvertent operation.

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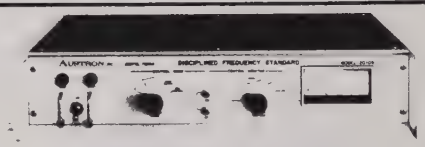
MODEL 2010B



DISCIPLINED FREQUENCY STANDARD

GENERAL

The Austron Model 2010B Disciplined Frequency Standard consists of an Austron Model 1150 High Stability Crystal Oscillator and third-order servo loop control circuitry.

The servo loop control is arranged so that a precision time base source such as a Loran-C Receiver, an Atomic Frequency Standard, or other suitably stable standard frequency system may furnish the reference for controlling the phase and frequency of the internal Model 1150 Oscillator. Under this control, the Model 2010B provides outputs (at 1 MHz and 5 MHz) that are closely locked to the phase and frequency of the reference. Because of third-order control, the servo "learns" the frequency offset and aging rate of the internal oscillator so that, should the reference be temporarily unavailable, the phase and frequency of the Model 2010B outputs will continue in close agreement with the extrapolated reference.

SPECIFICATIONS

ELECTRICAL

Reference Frequency Input:
1 MHz $\pm 3 \times 10^{-7}$, +1 to +10 Vpp into 680 ohms, BNC rear panel connector; stability, $\pm 1 \times 10^{-9}$/day.

Standard Outputs:
1 MHz and 5 MHz (locked to the reference input), 4 Vpp minimum, 50 ohms, square wave. Rise/fall time less than 20 nanoseconds. BNC rear panel connectors, two for each frequency.

Time Constants:
First Loop – 5 or 250 or 5000 seconds, selected by front panel switch.
Second Loop – 50,000 seconds.
Third Loop – 200,000 seconds.

Temperature:
0°C to +50°C.

Power:
Line – 115 or 230 Vac ± 15%, 48-420 Hz, 25 watts.
Standby – 22-32 Vdc, 0.8 amps.

PHYSICAL

Dimensions:
17 x 12 x 3½ inches (43.2 x 30.5 x 13.3 cm)

Weight:
Approximately 16 lbs. (7 kg)

Mounting:
Adapters supplied for standard 19 inch rack mounting.

Accessory Package:
Power cord, extender card, spare fuses and lamps, alignment tool, DC power connector, and technical manual.

APPLICATIONS

Applications are found in cases where there is a need for an uninterrupted working stable time base standard that is referenced to an atomic or National Standard time base.

FEATURES

- ☐ Third-order servo controls internal oscillator's aging rate, phase offset and frequency offset with respect to input reference.
- ☐ High stability internal crystal oscillator and third-order loops give the instrument "memory" which allows it to coast for long periods without input reference.
- ☐ Functionally oriented front panel controls provide simple but precise adjustment of instrument during initialization/re-initialization procedures.

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MODEL 2021L

LORAN-C DIRECTIONAL ANTENNA

GENERAL

The Austron Model 2021L is a shielded loop antenna tuned to 100 kHz, intended for use in receiving Loran-C signals.

The "Figure of Eight" pattern is very useful in receiving Loran-C signals when there is an interfering signal arriving from the "Side" of the antenna. The antenna may be oriented to provide the maximum desired signal while minimizing an interfering signal.

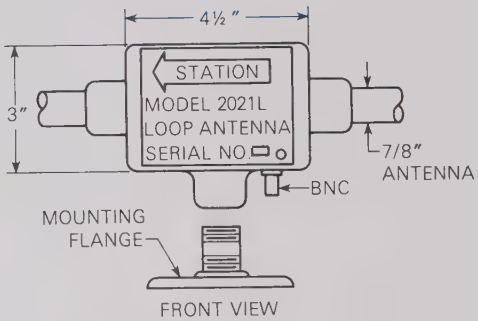
SPECIFICATIONS

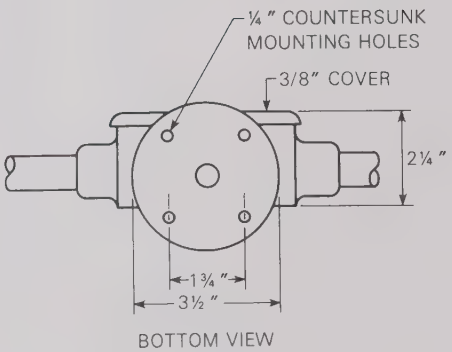
ELECTRICAL

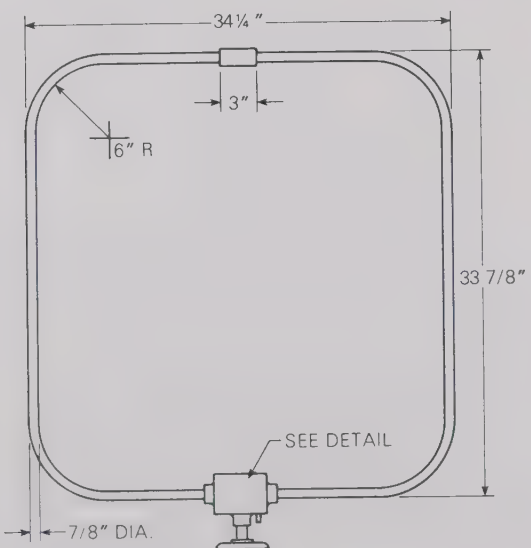
Frequency: 100 kHz
Area: 1.9 m²
Effective Height: 7.9 mm
Equivalent Height: 7.1 m (50 Ohm Termination)
Horizontal Pattern: p = cos (Figure of Eight) measured on plane of antenna.
Impedance: 50 Ohms Resistive

PHYSICAL

Mounting: To Horizontal Surface by Standard 3½" Diameter Pipe Flange
Dimensions: 33 7/8 x 34¼ x 7/8 inches (86.4 cm x 87 cm x 2.2 cm)
Weight: 6½ lbs (2.9 kg)
Connectors:
BNC (Austron Part No. 32092613) Standard
TNC (Austron Part No. 32092613-1)
Internal BNC (Austron Part No. 32092613-2)







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MODEL 2026W

LORAN-C VERTICAL ANTENNA

GENERAL

The Austron Model 2026W Loran-C whip antenna is a tuned band pass omnidirectional receiving antenna.

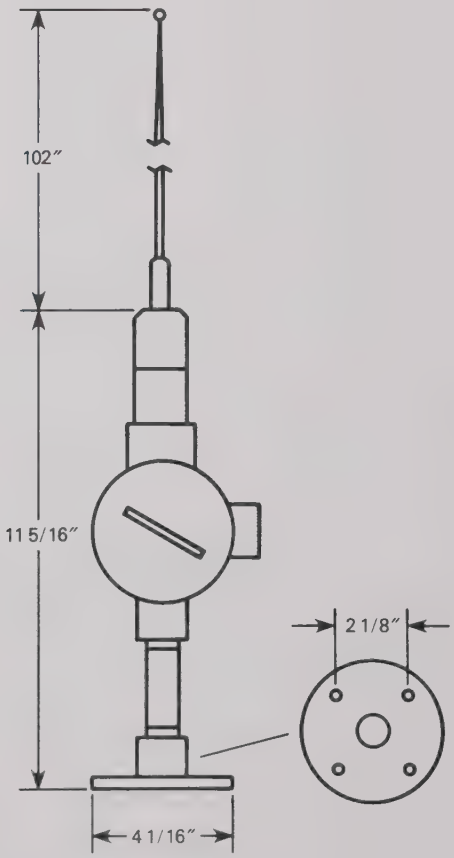
SPECIFICATIONS

ELECTRICAL
- Frequency: 100 kHz
- Bandwidth: 60 kHz @ -3 db
- Effective Height: 16 mm @ 100 kHz (50 ohm terminator)
- Output Impedance: 50 ohm nominal
- Choice of Antenna Connectors:
  - BNC (Austron Part No. 32098578)
  - TNC (Austron Part No. 32098578-1)
  - UHF (Austron Part No. 32098578-2)

PHYSICAL
- Mounting: 1" NPT Floor Plate
- Physical: 102" Stainless Steel Whip
- Recommended Cable: RG-58 C/U (100' with connectors supplied)

FEATURES

- ☐ Stainless Steel Whip screws into the Antenna Coupler.
- ☐ Antenna connector is recessed inside of the Antenna Coupler.
- ☐ Mounting Plate: Holes are at 90 degrees offset, outside diameter is 4 inches.



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MODEL 2055A

PHASE MICROSTEPPER

GENERAL

The Austron Model 2055A Phase Microstepper is designed to accept a 1 MHz or 5 MHz standard time base signal and to shift its phase in accordance with a digitally programmed instruction. The phase change may be a single step, or may occur at an essentially uniform rate. Digital control of the phase step or rate is effected by setting a six-digit front panel thumbwheel switch, or by means of a six-decade BCD remote digital control input. Phase equivalent rate span of the Model 2055A extends from 0.00000 ns/sec to ±9.99999 ns/sec; digitally exact time base frequency adjustments having a resolution of 1×10^{-14} may be made.

SPECIFICATIONS

ELECTRICAL

Power:
115 or 230 Vac ± 15%, 50–400 Hz, 30 VA, or 22–32, Vdc, 1 amp

Standard Input:
1 MHz or 5 MHz, 0.5 to 5.0 Vrms into 50 ohms, sine or square wave

Remote Control Input:
6-decade, zero reference, positive 8421 logic, TTL compatible

Panel Control Input:
6-decade thumbwheel switch

Outputs:
5 MHz, 1 MHz and 100 kHz, sine waves, 1 Vrms ± 20% from 50 ohms into 50 ohms

Offset Range:
0.00000 to ±9.99999 ns/second in .00001 ns steps

Phase Step Range:
0 to ±9.99999 ns in 0.00001 ns increments, with 0.1 ns basic granularity

Phase Step Accuracy:
Within ±2 ns of selected step or rate-time product

Stability:
±25 ns, 0° to +50°C
±1 ns, 115 Vac ±15%, or 22-32 Vdc
±5 ns, specified input range. 1 MHz or 5 MHz

PHYSICAL

Dimensions:
16¾ x 12 x 3½ inches (92.6 x 30.5 x 39 cm)

Weight:
15 pounds (7 kg)

Mounting:
19 inch rack or bench

APPLICATIONS

- ☐ When used in a system that bases time on the average of the frequencies of an ensemble of atomic standards, the Model 2055A may be adjusted (with nanosecond per day resolution) to make up the difference between the frequency of the system's working standard and the computed ensemble average, so that the time base that is actually distributed accurately manifests the ensemble average.
- ☐ To coordinate standard frequency the need for adjusting the frequency of the system's working standard is obviated, and the full intrinsic stability of the standard may be realized. Thus, C-field adjustments of a cesium standard may be avoided entirely for the instrument's life, and problems of post-adjustment settling and uncertainty of the final magnitude of the adjustment itself are avoided.
- ☐ The Model 2055A may also be used as a precision offset generator, for converting time base scales, or as an instrument for testing high resolution phase comparators for linearity and range.

FEATURES

- ☐ Precise offset frequency generator
- ☐ Real-time interface for time standard ensemble
- ☐ Subnanosecond phase step generator

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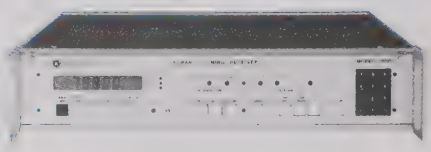
MODEL 2100



LORAN-C TIMING RECEIVER

GENERAL

The Austron Model 2100 Loran-C Time and Frequency Receiver is an automatic acquisition, tracking and time synchronizing receiver. The Model 2100 Loran-C Timing Receiver provides a traceable reference for time recovery as well as frequency calibration and control. This state-of-the-art device has remotely programmable control capabilities. Those who are vitally interested in high resolution time determination and frequency management will appreciate the improved sensitivity, automated features and simplicity of operation of this new receiver. The operation of this receiver, using Loran-C groundwave signals, will permit time epoch determination to an accuracy of one microsecond and frequency calibration measurements to within an accuracy of one or two parts in 10^{12} for one-day averaging. The Model 2100 Loran-C Timing Receiver allows the unskilled operator to obtain precise results for time measurement and frequency calibration by using an almost totally automatic approach with equipment of the highest reliability.

SPECIFICATIONS

ELECTRICAL

Sensitivity: 0.01 μvolt into 50Ω at tracking point.
RF Bandwidth: 40 kHz in track mode; 4 kHz in acquire mode.
RF Gain Control: AGC with a dynamic range of 127 dB (microprocessor controlled).
Input Reference Frequency: 1, 5, or 10 MHz at 0.5 to 5 Vrms (internally switch selectable).
External 1PPS Input: A TTL compatible sync input port.
Output Frequencies: 1 and 10 MHz square waves, TTL compatible. Phase corrected to Loran-C.
Analog Output: 0 – +1 volt DC, 5 milliamperes
Two Ranges: 0 – 1 μs (0 – +1 volt)
0 – 10 μs (0 – +1 volt)
Fixed 1PPS Output: TTL compatible, 0.5 second positive pulse.
Slewable 1PPS Output: TTL compatible, 0.5 second positive pulse.
Scan Strobe: Scan strobe output provides on demand, a slow-scanned averaged Loran-C waveform voltage suitable for driving an external strip chart recorder for a record of cycle identification, ±5V into 1KΩ.
Servo Resolution: 10 nanoseconds.
Scope Trigger Output: A TTL compatible signal at the GRI.
Scope Vertical Output: ±12V into 1KΩ signal which displays the RF signal plus a tracking point marker step.
Carrier Relay Output: An open collector output, +30V @ 25 milliamps, which is low when the servos are in the locked mode. Jumper configurable for +5V or +12V output.

(Specifications continued on page 2.)

APPLICATIONS

- ☐ Provides traceable time-of-day (Coordinated Universal Time) with microsecond accuracy to the National Bureau of Standards (NBS), the United States Naval Observatory (USNO) and the International Bureau of the Hour (BIH).
- ☐ Eliminates the skywave uncertainties and time-consuming averaging techniques associated with VLF/LF Frequency Management Systems.
- ☐ Provides a traceable frequency comparison with an accuracy of parts in 10^{12} in a day, parts in 10^{13} in less than two weeks by use of the direct groundwave signal.
- ☐ Supplies data to intercompare widely separated atomic standards of both time and frequency.
- ☐ Establishes a precise time epoch determination approaching submicrosecond accuracy for scientific observations and propagation studies.
- ☐ Used to calibrate local clocks and frequency sources with traceability to the National Bureau of Standards.

FEATURES

- ☐ Microprocessor control of all acquisition and tracking functions.
- ☐ Numeric Time-of-Day clock display.
- ☐ Calculated frequency offset of the local reference with respect to the Loran-C station is displayed on the LCD.

SPECIFICATIONS 2100 Continued

POWER
AC: 115/230 Vac ± 10% switch selectable at 50-400 Hz, 35 watts.
DC Standby input: +22 to +32 Vdc, 1.5A max., negative ground. Auto switchover upon loss of AC power.

INDICATORS
LCD: 8-digit numeric display with backlighting.
LED: Track and Loran-C signal status.

PHYSICAL
Dimensions: 19" rack mountable with provisions for chassis slides. 3½"H x 14½"D x 17"W (8.9 x 36.8 x 43.2 cm).
Weight: Less than 20 pounds (9 kg).
Temperature: 0 to +50°C operating, -40 to +75°C storage.

OPTIONS
Interface: IEEE-488 bus.

FEATURES Continued

- ☐ The phase difference between the Loran-C signal and the local frequency reference is provided as a 0 to +1 volt analog signal which may be used to drive an external chart recorder for a permanent record; it is also provided in numeric form on the LCD; and it can be supplied through an IEEE-488 interface bus.
- ☐ The scan strobe output provides a slow-scanned averaged Loran-C signal waveform voltage suitable for driving an external strip chart recorder. The precise tracking point of the Loran-C signal may then be kept as a permanent record.
- ☐ LCD backlighting.
- ☐ Front panel access for ease of maintenance and card replacement.
- ☐ Loran-C acquisition and transmission status indicators (including station blinking and loss of signal).
- ☐ Optimum use of microprocessor technology to accomplish calculations and to permit synchronizing the local 1PPS to Coordinated Universal Time (UTC).
- ☐ Receiver gain is automatically adjusted.
- ☐ The instrument's built-in time interval counter enables the operator to measure the time difference between an external 1PPS signal and the Loran referenced 1PPS and/or between the Loran referenced 1PPS and an internally generated 1PPS signal which may be slewed along the time axis in order to place it in coincidence with Universal Time Coordinated (UTC).
- ☐ AC/DC operation.
- ☐ Remote control through optional IEEE-488 interface bus.
- ☐ Compact instrument package.
- ☐ The front panel controls can be locked-out to prevent accidental interruption of services.

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MODEL 2100F

LORAN-C FREQUENCY MONITOR

GENERAL

The Austron Model 2100F Loran-C Frequency Monitor is an automatic acquisition and automatic tracking Loran-C receiver, with remotely programmable control capabilities that provide traceable phase-stable frequency references on 1 MHz and 10 MHz suitable for frequency management, calibration and control. Standards laboratories, atomic standards research groups, telecommunications groups, and others who are vitally interested in high resolution frequency measurement and intercomparison will appreciate the improved sensitivity and ease of operation of this new automatic receiver. After the operator enters the Group Repetition Interval for the Loran-C chain nearest his site, the Model 2100F automatically acquires a suitable station and settles to the track mode. In addition to the phase-stable 1 MHz and 10 MHz reference outputs, the relative phase difference between the Loran-C station and the local frequency reference is provided as a 0 to +1 volt analog signal to drive an external chart recorder for a permanent record. The frequency offset of the local reference with respect to the Loran-C station is also calculated and can be displayed on the LCD display. Indicators on the front panel show at a glance the status of the receiver (acquire, track, or servo-locked modes) and the status of the Loran-C signal (station blinking or low signal-to-noise ratio). The front panel controls can also be locked out to prevent accidental interruption of service.

SPECIFICATIONS

ELECTRICAL

Sensitivity:
0.01 microvolt into 50 ohm at tracking point.

RF Bandwidth:
40 kHz in track mode; 4 kHz in acquire mode

RF Gain Control:
AGC with a dynamic range of −32 dB to +95 dB (microprocessor controlled)

Input Reference Frequency:
1, 5, or 10 MHz at 0.5 to 5 Vrms (internally switch selectable)

Output Frequency:
1 MHz and 10 MHz square wave, TTL compatible. Phase corrected to Loran-C.

Analog Output:
0−1.0 volt DC
Two Ranges: 0−1 microsecond
(Selectable) 0−10 microseconds

POWER:

AC:
115/230 Vac ± 10% switch selectable, 48−420 Hz

DC STBY:
+22 to +32 Vdc negative ground. Auto switch-over on primary failure.

(Specifications continued on page 2.)

APPLICATIONS

- ☐ Replaces CW VLF/LF for frequency management.
- ☐ Provides a traceable frequency comparison to an accuracy of parts in 10^{12} in a day, parts in 10^{13} in less than two weeks.
- ☐ Used to calibrate local frequency sources with traceability to the National Bureau of Standards (NBS) and the United States Naval Observatory (USNO).
- ☐ Supplies data to intercompare widely separated atomic standards.
- ☐ Used to directly control phase-locked oscillators and disciplined frequency standards in both military and commercial telecommunications applications; e.g., master clock control for microwave radio relays, satellite TDMA clock control, common carrier data link synchronization, etc.

FEATURES

- ☐ Microprocessor control of all acquisition and tracking functions.
- ☐ Numeric digital display and analog phase comparison.
- ☐ Loran-C transmissions status indicators.
- ☐ Compact instrument package.
- ☐ AC/DC operation.
- ☐ Optimum gain set by microprocessor control.
- ☐ Remote control through optional IEEE-488 BUS.

SPECIFICATIONS 2100F Continued

INDICATORS:
- LCD: 8-digit numeric display with backlighting
- LED: Track and Loran-C signal status

PHYSICAL
- Dimensions: 19" rack mountable with provisions for chassis slides. 3½ x 14½ x 17 inches (8.9 x 36.8 x 43.2 cm)
- Weight: Less than 20 pounds (9 kg)
- Temperature: 0 to +50°C operating. −40° to +75°C storage

OPTIONS
- Interface: IEEE-488

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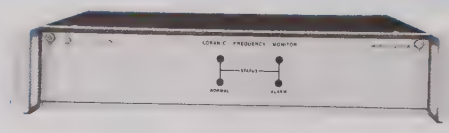
MODEL 2100R



LORAN-C REFERENCE RECEIVER

GENERAL

The Austron Model 2100R is an automatic acquisition LORAN-C Reference Receiver, capable of tracking any LORAN-C station in the user's area, for the purpose of comparing a local frequency source to the cesium standard used by the LORAN-C station. The 2100R Reference Receiver is a modified version of the 2100F Frequency Monitor. The unit is designed to act as a stable reference frequency source for disciplined frequency standards in communications systems and other applications where a minimum of operator interface is desired.

Operation of the unit is simple. Select the chain to be used by adjusting switches on the inside of the front panel. When the unit is powered up it will automatically begin to acquire and track stations of that chain. Should the station selected be lost for any reason, the unit will automatically select and track another station in the chain. If the power is interrupted, the unit will re-acquire after the power has been returned.

The outputs of the unit are the same as on the 2100F; a 1 and a 10 MHz phase corrected signal capable of driving either of Austron's Disciplined Frequency Standards. The unit requires a reference input frequency as does the 2100F monitor.

Much of the operator information, such as the actual frequency stability measurements and accumulated phase information, is not available from the front panel on the 2100R as it is on the 2100F. This information is now accessed through a 488 bus option.

SPECIFICATIONS

ELECTRICAL

Sensitivity:
0.01 microvolt into 50 ohms at tracking point

RF Bandwidth:
40 kHz in track mode; 4 kHz in acquire mode

RF Gain Control:
AGC with a dynamic range of −32 dB to +95 dB (microprocessor controlled)

Analog Output:
Voltage output representing accumulated phase shift, 0 to 1.0 Vdc

POWER

AC:
115/230 Vac ± 10% switch selectable, 48 to 420 Hz

DC Standby:
+22 to +32 Vdc negative ground, auto switchover on primary failure

INDICATORS

Normal:
Pair of LEDs that indicate the receiver has acquired and is tracking the LORAN-C signal.

Alarm:
Pair of LEDs that indicate the receiver is in the process of locating the LORAN-C signal.

(Specifications continued on page 2.)

APPLICATIONS

- ☐ Widely used as a STRATUM ONE clock reference by communications companies.
- ☐ Provides a traceable frequency comparison to an accuracy of parts in 10^{12} in a day and parts in 10^{13} in less than two weeks' averaging time.
- ☐ Used to calibrate local frequency sources with traceability to the National Bureau of Standards and the U.S. Naval Observatory.
- ☐ Traceable to Coordinated Universal Time (UTC).
- ☐ Supplies data to intercompare widely separated atomic standards.

FEATURES

- ☐ Microprocessor control of all acquisition and tracking functions.
- ☐ 8 nanosecond servo resolution.
- ☐ 0.01 microvolts RF sensitivity.
- ☐ No operator intervention required.
- ☐ Front panel redundant LED alarms and remote alarm capabilities.
- ☐ Rack mountable in either standard instrument cabinet or open relay rack.
- ☐ AC/DC operation.
- ☐ Remote controllable through optional IEEE-488 bus.

Technical specifications subject to change without notice.

SPECIFICATIONS (continued)

CONTROLS

Chain Selection (GRI):

Internal, four 10-position rotary switches used to enter the GRI of the LORAN-C chain to be tracked.

CONNECTORS

Antenna:

Antenna input, 50 ohms nominal

Input Reference Frequency:

1, 5 or 10 MHz at 0.5 to 5 Vrms (internally switch selectable)

Output Reference Frequency:

1 and 10 MHz square wave, TTL compatible. Phase corrected to LORAN-C.

Scope Vertical:

Buffered RF output for viewing the LORAN-C signal on an oscilloscope

Scope Trigger:

Scope trigger output

Carrier Relay:

Open collector indicates when the receiver is tracking (transistor off) or not tracking (transistor on)

PHYSICAL

Dimensions:

3½ × 14½ × 17 inches, 19" rack mountable with provisions for chassis slides

Weight:

Less than 15 pounds

Temperature:

0 to +50°C operating, −40° to +75°C storage

OPTIONS

IEEE-488:

Meets IEEE-488-78 interface specifications

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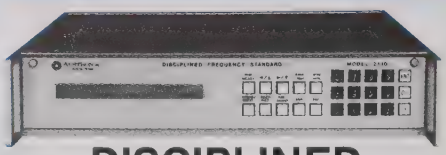
MODEL 2110



DISCIPLINED FREQUENCY STANDARD

GENERAL

The Austron Model 2110 Disciplined Frequency Standard is a state-of-the-art, microprocessor controlled system that automatically locks the frequency of its precision ovenized crystal oscillator to that of an externally applied reference having superior long-term stability. With the use of a third-order servo technique, the instrument is able to correct the frequency offset and aging of the internal oscillator. If the externally applied reference is removed or fails, the Model 2110 will continue to apply corrections to the internal oscillator in an effort to eliminate its aging and thereby hold it on frequency. Typically the unit can limit the frequency offset to parts in 10^{12} for several days following reference loss.

SPECIFICATIONS

ELECTRICAL

Reference Frequency Input(s):
1, 5, or 10 MHz, 1 to 4 Vpp. Input impedance 1 megohm (50 ohm feed-through terminator included with instrument)

Standard Outputs:

Sinewave Outputs:
Frequencies: 1 each of 1, 5 and 10 MHz (100 kHz optional)
Levels: 1 Vrms ± 10% @ 50 ohms
Harmonics: < -50 dBc
Spurious: < -80 dBc
Isolation: $\triangle f/f < 1 \times 10^{-11}$ from no load to 50 ohms

TTL Output:
Frequencies: 1, 5, 10 MHz or 100 kHz (front panel selectable)
Level: TTL, $Z_0 = 50$ ohms
Duty Cycle: 50% ± 5%
Rise/Fall Time: ≤ 10 ns
Jitter: < 100 ps

1 PPS Output:
Level: TTL, $Z_0 = 50$ ohms
Pulse Width: 20 μs
Rise/Fall Time: ≤ 10 ns
Jitter: < 100 ps

Warm up:
Less than two hours to within 5×10^{-11} of the reference frequency

Synchronization Input for 1 PPS:
Levels: 1 to 10 Vpp, positive going edge is referenced
Input impedance: > 1 kΩ or 50 Ω, factory selected jumper option
Pulse Width: ≥ 1 μs
Rise Time: ≤ 1 μs
Synchronization accuracy: ± 100 ns for rise time of synchronization input ≤ 20 ns

(Specifications continued on page 2.)

APPLICATIONS

- ☐ Metrology: When used in combination with Austron Frequency Monitoring Equipment, the Model 2110 will provide stable frequencies to parts in 10^{12} accuracy traceable to the National Bureau of Standards (NBS) and United States Naval Observatory (USNO).
- ☐ Clock Systems: The Model 2110 will act as an accurate stable clock for timing applications requiring accuracies to ± 100 ns, providing an accurate and stable 1 PPS that can be synchronized by an external atomic clock or with an Austron Timing Receiver.
- ☐ Communications Systems: Where spectral purity and redundancy are of paramount importance, the Model 2110 can act as a redundant frequency source and switch. The device will allow selection of either of two stable sources without phase or frequency perturbation in the output.
- ☐ Frequency Measurement: With the Model 2110 acting as a frequency difference meter, a new dimension to the Disciplined Frequency Standard is added. The error multiplication and scaling techniques included in the instrument for frequency management and control purposes make the device extremely useful for quickly setting oscillators on frequency to very high accuracies.

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SPECIFICATIONS 2110 Continued

CERTIFICATION

EMISSIONS:

The Model 2110 with all options except the IEEE interface, has been tested and found to meet the requirements of FCC Part 15, Sub-part 1, Conducted and Radiated Emission Standards for Class A Computing Devices when operated with all covers in place and outputs terminated in full loads.

Environmental:

The Model 2110 has been environmentally tested in accordance with methods of MIL-STD 810C.

Temperature:

0° to +50°C operating
-40° to +60°C storage with internal battery option
-40° to +75°C without battery option

Humidity:

0 to 95% non-condensing

Altitude:

Operating to 15,000 feet, storage to 40,000 feet

(NOTE: For storage of units with internal battery option for greater than 90 days, the battery pack must be removed.)

POWER

Line:

115/230 VAC ±10% switch selectable, 47 to 420 Hz, 32 watts, automatic switchover to standby or internal battery pack.

Standby:

22 to 56 VDC, ± ground (user selectable), 29 watts maximum.

FREQUENCY LOCKED LOOP (FLL) OPERATIONAL SPECIFICATIONS

Measurement of $\triangle f/f$ of Internal Oscillator vs Reference(s):

Interval: 2 to 100 s, variable in 10 ms increments
Resolution: 5×10^{-12} to 1×10^{-13}, function of interval

Internal Oscillator Electronic Tuning:

Range: 4×10^{-8} from 2 to 8 Vdc
Resolution: 1×10^{-12}
Mechanical Adjustment: $\pm 1 \times 10^{-7}$

FLL Capture Range:

$\pm 2 \times 10^{-8}$ with mechanical tuning centered

Acquisition Time:

From cold start, internal oscillator will be within 5×10^{-11} of the stable reference in less than two hours.

FLL Type:

Type III (Three pure integrations performed in the feedback path.)

Frequency Offset:

$< 1 \times 10^{-12}$ over any 24-hour averaging time
$< 5 \times 10^{-11}$ over temperatures 0° to +50°C

FEATURES Continued

- ☐ Microprocessor controlled
- ☐ 80 character alphanumeric liquid crystal display, programmable via front panel keyboard and function switches.
- ☐ High-stability internal crystal oscillator
- ☐ Front panel selectability of TTL outputs of 1, 5, 10 MHz or 100 kHz
- ☐ Spectrally pure sinewave output signals of 1, 5 and 10 MHz
- ☐ Internal ability to measure frequency offset of the external reference vs the internal oscillator
- ☐ 1 PPS clock output (externally synchronizable)
- ☐ Third-order servo oscillator control system

OPTIONAL FEATURES

- ☐ A dual reference frequency input option allows the user a choice of external references: either a combined dual reference mode or a primary/secondary mode that are front panel selectable
- ☐ IEEE-488 Bus interface
- ☐ One hour internal battery

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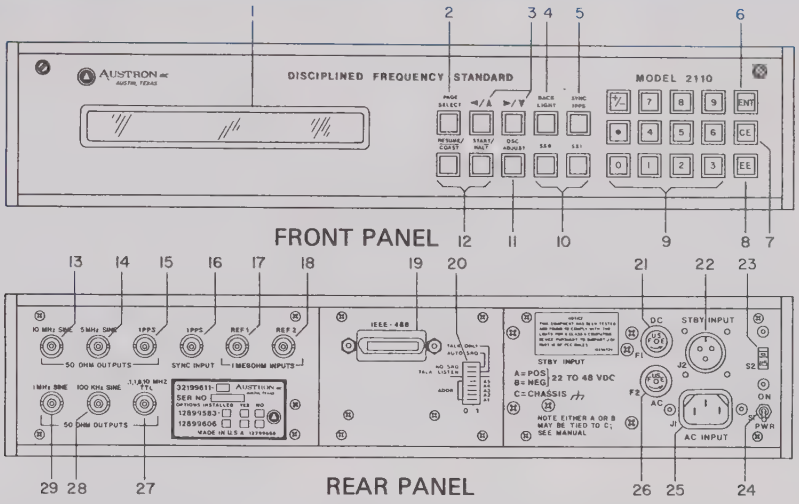

PHYSICAL

Dimensions:
17 x 15½ x 3½ inches (43.2 x 39.4 x 8.9 cm).

Weight:
24 pounds (10.9 kg). Approx. shipping weight 35 pounds (15.9 kg)

Mounting:
19 inch rack mountable with provisions for chassis slides

Signal Connectors:
All signal connectors are BNC

REFERENCE DESCRIPTION

1 Dot Matrix Liquid Crystal Display

2 Page Select Pushbutton

3 ←/↑ Pushbutton
→/↓ Pushbutton

4 Backlight Pushbutton

5 Sync 1 PPS Pushbutton

6 Enter Pushbutton

7 Clear Entry Pushbutton

8 Enter Exponent Pushbutton

9 Numeric Keypad Pushbuttons

10 Special Software 1 Pushbutton
Special Software 0 Pushbutton

11 Oscillator Adjust Pushbutton

12 START/HALT Pushbutton
RESUME/COAST Pushbutton

REFERENCE DESCRIPTION Continued

13 10 MHz Sine Output

14 5 MHz Sine Output

15 1 PPS Output

16 1 PPS Sync Input

17 Reference 1 Input

18 Reference 2 Input

19 IEEE-488 Connector

20 IEEE-488 Address Switches

21 Fuse DC 3AG2A

22 22-48 Vdc
DC Standby Connector

23 115-230 Vac Line Voltage Selector Switch

24 Power Switch

25 115-230 Vac Connector

26 Fuse
115 V = 3AG1ASB
230 V = 3AG1/2ASB

27 .1, 1, 5, 10 MHz TTL Output

28 100 kHz Sine Output

29 1 MHz Sine Output

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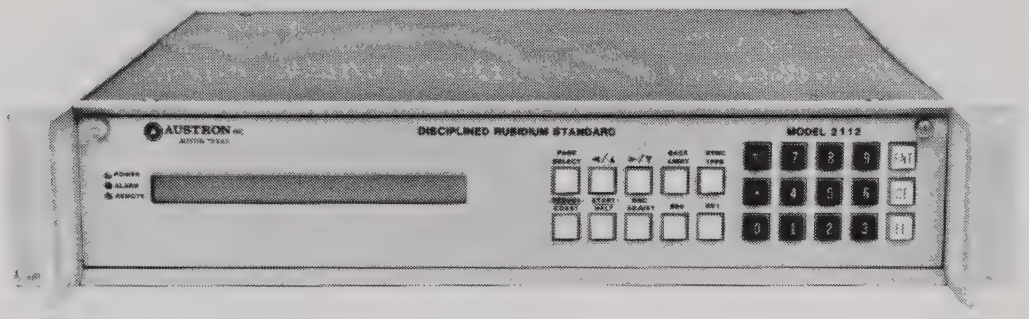
MODEL 2112



DISCIPLINED RUBIDIUM STANDARD

GENERAL

The **Austron Model 2112 Disciplined Rubidium Standard** is a state-of-the-art, microprocessor-controlled systems that automatically locks the frequency of its precision Rubidium oscillator to that of an externally applied reference having superior long-term stability. With the use of a second order servo technique, the instrument corrects the frequency offset and aging of the internal oscillator. If the externally applied reference is removed or fails, the **Model 2112** freezes the electronic tuning voltage to the internal oscillator thereby holding its last frequency. Typically the unit can limit the frequency offset to parts in 10^{11} for several weeks following reference loss.

SPECIFICATIONS

ELECTRICAL

Reference Frequency Input(s):
1 MHz, 5 MHz or 10 MHz, 1 to 4 Vp-p. Input impedance 1 M Ω
(50 Ω feed-through terminator included with instrument)

Standard Outputs:

Sinewave Outputs:
Frequencies: 1 each of 1 MHz, 5 MHz and 10 MHz (100 kHz optional)
Levels: 1 Vrms 10 % @ 50 Ω
Harmonics: -50 dBc
Spurious: -70 dBc
Isolation: $\Delta f/f < 1 \times 10^{-11}$ from no load to 50 Ω

TTL Output:
Frequencies:1 MHz, 5 MHz, 10 MHz or 100 kHz (front-panel-selectable)
Level: TTL, Z_0 = 50 Ω
Duty Cycle: 50 % ±5 %
Rise/Fall Time: ≤10 ns
Jitter: < 100 ps

1 PPS Output:
Level: TTL, Z_0 = 50 Ω
Pulse Width: 20 μs
Rise/Fall Time: ≤10 ns
Jitter: < 100 ps

APPLICATIONS

- Metrology: When used in combination with Austron Frequency Monitoring Equipment, the Model 2112 will provide stable frequencies to parts in 10^{12} accuracy traceable to the National Bureau of Standards (NBS) and United States Naval Observatory (USNO).
- Clock Systems: The Model 2112 acts as an accurate, stable clock for timing applications requiring accuracies to ±100 ns, providing an accurate and stable 1 PPS synchronizable to an external atomic clock or with an Austron Timing Receiver.
- Communications Systems: The Model 2112 allows selection of either of two stable sources without phase or frequency perturbation in the output and provides a backup frequency source on loss of reference.

SPECIFICATIONS (continued)

Warm-up:
Less than two hours to within 1×10^{-11} of the reference frequency
Synchronization Input for 1 PPS:
Levels: 1 to 10 Vp-p, positive-going edge is referenced
Impedance: 1 k Ω/50 Ω, jumper-selectable option
Pulse Width: ≥1 μs
Rise Time: ≤1 μs
Accuracy: ± 100 ns for rise time of sync. input ≤20 ns

EMISSIONS CERTIFICATION

- The Model 2112 with all options except the IEEE interface, has been tested and found to meet the requirements of FCC Part 15, Sub-part 1, Conducted and Radiated Emission Standards for Class A Computing Devices when operated with all covers in place and outputs terminated in full loads.

ENVIRONMENTAL

- The Model 2112 has been environmentally tested in accordance with methods of MIL-STD 810C.

Temperature:
0° C to 50° C operating
-40° C to 60° C storage with internal battery option
-40° C to 75° C without battery option
Humidity:
0 to 95% noncondensing
Altitude:
Operating to 15,000 ft (4,572 m), storage to 40,000 ft (12,192 m)

POWER

Line:
115/230 Vac 10% switch-selectable, 47 Hz to 420 Hz, 32 W, auto switchover to standby or internal battery pack.
Standby:
22 Vdc to 57 Vdc, positive/negative grounded (user-selectable), 29 W max.

FREQUENCY LOCKED LOOP (FLL) OPERATIONAL SPECIFICATIONS:

Measurement of $\Delta f/f$ of Internal Oscillator vs Reference(s):
Interval: 2 to 200 s, variable in 10 ms increments
Resolution: 5×10^{-12} to 5×10^{-14}, function of interval
Internal Oscillator Electronic Tuning:
Range: 4×10^{-9} from 2 Vdc to 8 Vdc
Resolution: 1×10^{13}
Mechanical Adjustment: $\pm 2 \times 10^{-9}$
FLL Capture Range:
$\pm 2 \times 10^{-9}$ with mechanical tuning centered
Acquisition Time:
From cold start, internal oscillator will be within 1×10^{-11} of target offset with respect to the stable reference in less than two hours.
FLL Type:
Type II (Two pure integrations performed in the feedback path.)

PHYSICAL

Dimensions:
17 x 15.5 x 3.5 in (43.2 x 39.4 x 8.9 cm)
Weight:
24 lb (10.9 kg). Approximate shipping weight 35 lb (15.9 kg)
Mounting:
19 in (48.3 cm) rack-mountable with provisions for chassis slides
Signal Connectors:
All signal connectors are BNC

FEATURES

- Microprocessor-controlled
- 80-character alphanumeric liquid crystal display, programmable via front panel keyboard and function switches
- Long-term, high-stability internal rubidium oscillator
- Front-panel-selectable TTL outputs of 1 MHz, 5 MHz, 10 MHz or 100 kHz
- Sinewave output signals of 1 MHz, 5 MHz and 10 MHz
- Internally measures frequency offset of external reference vs internal oscillator
- 1 PPS clock output (externally synchronizable)
- Second order servo oscillator control system
- Frequency and phase offsettability
- Alarm signal and LED for monitoring unit

OPTIONAL FEATURES

- Dual reference input: front panel selectable primary/secondary or statistically-combined modes
- IEEE-488 bus interface
- Internal battery back-up

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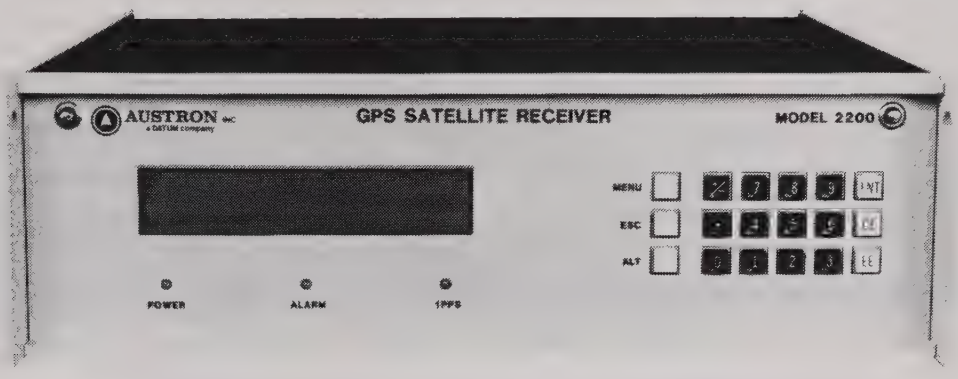
MODEL 2200



GPS SATELLITE RECEIVER

GENERAL

The **AUSTRON Model 2200** is an automatic acquisition Global Positioning System (GPS) satellite receiver, capable of tracking up to eight satellites. A single channel sequencing receiver, the Model 2200 tracks the C/A (coarse acquisition) code on the L_1 carrier frequency (1575.42 MHz). While tracking at least one satellite, the receiver generates a 1 pps signal synchronized to UTC to better than 140 ns and a 0.1 MHz, 1 MHz, 5 MHz or 10 MHz output that is accurate to better than 5 parts in 10^{12}. When an external 1 pps signal is connected, the receiver measures the offset of that signal from UTC to better than 140 ns. An external 1 MHz, 5 MHz, or 10 MHz may also be connected, and its frequency offset measured to better than 5 parts in 10^{12}.

An important piece of equipment in most technical facilities (calibration laboratories, electronics laboratories, etc.) is an accurate frequency standard, because it is often used to calibrate other equipment, make accurate time measurements of physical events and keep accurate time-of-day. As a standard this frequency source must, itself, be checked and calibrated regularly, with traceability to a national standard of prime importance. The **Austron Model 2200 GPS Satellite Receiver** provides this calibration capability, with traceability to the United States Naval Observatory (USNO), which maintains the time and frequency accuracy of the NAVSTAR/Global Positioning System.

SPECIFICATIONS

ELECTRICAL

DATA INPUT
Numeric keypad and push button function keys

DATA OUTPUT
4-line X 40-character LCD, and LED status indicators

TIMING OUTPUTS
Accuracy:(C/A code not degraded)
1 PPS: Within 100 ns of GPS, 140 ns of UTC
1 PPM: Within 100 ns of GPS, 140 ns of UTC
Stability:
1 PPS, 1 PPM: 15 ns rms for 10-second average

APPLICATIONS

- Metrology: Used in combination with Austron Frequency Monitoring Equipment, the Model 2200 provides stable frequencies to parts in 10^{12} accuracy traceable to the National Bureau of Standards (NBS) and United States Naval Observatory (USNO).
- Clock Systems: The Model 2200 acts as an accurate, stable clock for timing applications providing a 1 pps signal synchronized to within 140 ns of UTC.
- Communications Systems: The Model 2200 acts as a frequency source providing reliable timing signals to drive high speed digital communications.

SPECIFICATIONS (continued)

Level:
1 PPS, 1 PPM: 3 volts into 50 Ω (min), TTL line driver
Pulse width:
1 PPS, 1 PPM: 20 μs
Rise time:
1 PPS, 1 PPM: < 10 ns

FREQUENCY OUTPUTS
Accuracy: (tracking)
$< 1.0^{-11}$, 10-second average
Level:
3 volts into 50 Ω (min), TTL line driver

ALARM OUTPUT
Relay: N.O./N.C. contacts show alarm conditions
TTL: "high/low" status shows alarm condition

1 PPS INPUT
Level:
1 to 10 Vp-p, positive or negative edge on-time (jumper-selectable)
Pulse Width:
≥ 1 μs
Rise Time:
100 ns
Input Impedance:
50 Ω or 1 kΩ, switch-selectable

EXTERNAL REFERENCE
Frequency:
1 MHz, 5 MHz or 10 MHz, sine or square wave
Level:
0.5 to 5 Vrms (Frequency accuracy $\geq 1.0^{-7)}$
Input Impedance:
50 Ω or 1 kΩ, switch-selectable

ENVIRONMENTAL
Operating:
Receiver: 0° C to 50° C
Antenna: -30° C to 75° C
Storage:
Receiver: -20° C to 70° C
Antenna: -40° C to 75° C
Humidity:
Receiver: 0 to 95%, noncondensing
Antenna: 100% (not immersed)

POWER
AC:
115 Vac (90 Vac to 130 Vac), 48 Hz to 70 Hz
75 VA warm-up, 60 VA oper. (crystal)
140 VA warm-up, 75 VA oper. (Rb option)
230 Vac (190 Vac to 260 Vac), 48 Hz to 70 Hz
75 VA warm-up, 60 VA oper. (crystal)
140 VA warm-up, 75 VA oper. (Rb option)
DC Standby:20 Vdc to 56 Vdc, pos./neg. ground, auto-switchover on loss of ac

DC Power Usage: (Watts, 25° C)	Warm-up	Operating
24 V, crystal	≤66	≤52
24 V, Rubidium	≤105	≤65
48 V, crystal	≤84	≤70
48 V, Rubidium	≤110	≤70

PHYSICAL
Receiver H: 5.25 in (13.3 cm) W: 19 in (48.3 cm) rack mount D:18 in (45.7 cm)
Weight: 22 lbs (10 kg)
Antenna Down/Converter H: 10 in (25.4 cm) D: 12 in (30.5 cm)
Weight : 6.5 lbs (2.9 kg)
Cable
RG58/U: 100 ft (30.5 m)

FEATURES

- Global reception of NAVSTAR GPS date, time and correction parameters
- Two 16-bit microprocessors
- Internal ovenized high-stability oscillator
- 4-line X 40-character alphanumeric LCD, programmable via front panel keyboard and function switches
- 1 pps/1 ppm outputs accurate to within 100 ns of GPS, to within 140 ns of UTC (based on undegraded C/A code transmissions)
- Front-panel displays accuracy of external 1 pps vs UTC/GPS
- TTL compatible square wave outputs of 0.1 MHz, 1 MHz, 5 MHz, 10 MHz
- LED indicators provide power, alarm and 1pps status

OPTIONAL FEATURES

- Remote control via IEEE-488 bus, RS-232 bus, and/or 1200 baud modem port
- Long-term, high-stability Rubidium oscillator package
- Centronix-compatible parallel port

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MODEL 2201

GPS SATELLITE TIME AND FREQUENCY RECEIVER

GENERAL

The **AUSTRON Model 2201** is an automatic acquisition Global Positioning System (GPS) satellite receiver, capable of tracking up to eight satellites at one time. A single channel sequencing receiver, the Model 2201 tracks the C/A (coarse acquisition) code on the L_1 carrier frequency (1575.42 MHz). While tracking one or more satellites, the receiver generates a 1 PPS and 1 PPM signal synchronized to within 100 nanoseconds of UTC and provides a 0.1 MHz, 1 MHz, 5 MHz or 10 MHz output that is accurate to better than 5 parts in 10^{12}. When an external 1 PPS signal is connected, the receiver measures the offset to corrected UTC or GPS to 0.1 nanosecond resolution. When an external 1 MHz, 5 MHz or 10 MHz signal is connected, frequency offset can be measured to better than 5 parts in 10^{12}. *

The AUSTRON Model 2201 GPS Satellite Time and Frequency Receiver provides time and frequency calibration traceability to the United States Naval Observatory (USNO) which maintains the time and frequency accuracy of the NAVSTAR/Global Positioning System and traceability to the National Institute of Standards and Technology (NIST), formerly National Bureau of Standards (NBS).

OPERATIONAL ADVANTAGES

Precision on site time and frequency reference calibration has become a virtual necessity worldwide for metrology, communications, electronic intelligence and a variety of other applications requiring precise time and frequency traceable to a single source. Virtually any application requiring an external time and/or frequency reference for calibration or synchronization purposes can be served by the AUSTRON Model 2201. Since the Model 2201 offers global access to UTC through the GPS master clock system, the necessity of transporting portable clocks to remote locations is eliminated. In terms of cost (both initial and follow-on), accuracy, ease of operation and logistical requirements the Model 2201 offers a worldwide advantage over any other type of time and frequency system of equal precision.

Installation and operation are simple and straightforward requiring no training or technical experience.

APPLICATIONS

- **METROLOGY**: Used to provide stable frequency to parts in 10^{12}, traceable to the USNO and NIST. *
- **CLOCK SYSTEMS**: Used to provide stable frequency to parts in 10^{12}, 1 PPS corrected to within 100 ns of UTC and time/day/date synchronized to UTC,GPS or Local time. *
- **COMMUNICATIONS SYSTEMS**: Used to provide stable frequency source providing reliable timing signals to drive high speed digital communications synchronized to a single source.

FEATURES

- Light weight
- Requires only 3.5 in of vertical rack space.
- Operates on AC or DC power.
- Nonvolatile memory maintains time, mode and entered parameters while power is off.
- Utilizes two 16-bit microprocessors.
- Automatic fault determination and reporting.
- Automatic worldwide receiver survey using "unknown" position entry and tracking four satellites.
- Up to 400 ft Antenna/Downconverter receiver separation using a single RG–58 coax cable. Up to 1500 ft using better grade of cable.
- Internal ovenized oscillator (disciplined to GPS while tracking at least one satellite).
- TTL compatible square wave output of 0.1 MHz, 1 MHz, 5 MHz or 10 MHz, menu selectable.

* Selective availability (SA) not implemented

SPECIFICATIONS

ELECTRICAL

DATA INPUT	Front panel keypad (data I/O port optional)
DATA OUTPUT	Front panel 4-line x 40-character super twist LCD display (printer/data I/O ports optional)
TIMING OUTPUTS	1 PPS and 1 PPM on rear panel BNC connectors
Accuracy:	100 ns relative of UTC *
Level:	3 volts into 50 Ω (min), TTL line driver
Pulse Width:	≥ 20 μs
Rise Time:	< 10 ns
FREQUENCY OUTPUT	0.1 MHz, 1 MHz, 5 MHz or 10 MHz menu selectable on rear panel BNC connector
Accuracy:	< 1 part in 10^{11}, 10 second averaging *
Level:	3 volts into 50 Ω (min), TTL line driver
1 PPS INPUT	On rear panel BNC connector
Level:	1 to 10 Vp-p, positive or negative on-time edge (jumper selectable)
Pulse Width:	≥ 1 μs
Rise Time:	< 20 ns
Input Impedance:	50 Ω or 1 kΩ, switch selectable
EXTERNAL REFERENCE INPUT	
Frequency:	1 MHz, 5 MHz or 10 MHz, sine or square wave input on rear panel BNC
Level:	0.5 to 5 volts RMS (frequency accuracy 1 part in 10^8)
Input Impedance:	50 Ω or 1 kΩ, switch selectable

ENVIRONMENTAL

OPERATING	
Receiver:	0°C to 50°C
Antenna:	-30°C to 75°C
STORAGE	
Receiver:	-40°C to 75°C
Antenna:	-40°C to 75°C
HUMIDITY	
Receiver:	0 to 95%, noncondensing
Antenna:	100% (not immersed)

POWER

AC:	115 Vac (90 Vac to 130 Vac), 48 Hz to 70 Hz, 70 VA warm-up, 60 VA operating	
	230 Vac (190 Vac to 260 Vac), 48 Hz to 70 Hz, 70 VA warm-up, 60 VA operating	
DC Standby:	20 Vdc to 56 Vdc, post./neg. ground, auto switchover on loss of ac power	
DC Power Usage:	(Watts, @ 25°C) Warm-up	Operating
24 Vdc	< 62	< 48
48 Vdc	< 80	< 66

* Selective availability (SA) not implemented

FEATURES (continued)

- 1 PPS and 1 PPM output synchronized to GPS or UTC.
- Raw satellite message parameters reported.
- Four-line 40-character alphanumeric super twist LCD front panel display.
- Front panel keypad for local data entry and control.
- Complete with Antenna/Downconverter and 100 ft. of RG–58 coaxial cable with TNC/TNC connectors.
- Time interval counter displays delta between Receiver generated 1 PPS and external 1 PPS signal. Resolution is 0.1 ns.
- Carrier tracking provides fast acquisition.

OPTIONS

- Remote control and data collection via IEEE-488 or RS232 I/O Port.
- Printer Port (Centronix-compatible).
- 1200 baud modem port.
- 200, 300, or 400 ft. RG–58 Antenna cable with TNC/TNC connectors.

SPECIFICATIONS (continued)

PHYSICAL

RECEIVER	
Height:	3.50 in (8.9 cm)
Width:	19 in (48.3 cm) rack mount
Depth:	18 in (45.7 cm)
Weight:	18 lbs (10 kg)
ANTENNA/ DOWNCONVERTER	
Height:	10 in (25.4 cm)
Circumference:	12 in (30.5 cm)
Weight:	6.5 lbs (2.9 kg)
Antenna Cable:	RG58/U: 100 ft (30.5 m)

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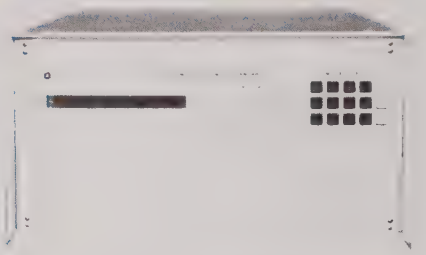
MODEL 2310



DISCIPLINED CESIUM FREQUENCY STANDARD

GENERAL

The Austron Model 2310 Disciplined Cesium Frequency Standard combines the convenience of microprocessor control with the accuracy and stability of its internal atomic standard. The Model 2310 can precisely adjust its output frequency without changing the magnetic field of the cesium beam. This nonmagnetic settability feature allows the Model 2310 to automatically match ts output frequency to that of an external reference. Should this reference oe nonatomic, the Model 2310 will calculate and display its aging rate.

SPECIFICATIONS

ELECTRICAL
- Reference Frequency Inputs:
  - 1, 5 or 10 MHz, 1 to 4 Vpp
  - Input impedance 1 megohm

STANDARD OUTPUTS
- Sinewave Outputs:
  - Frequencies: 1 each of 1, 5 and 10 MHz (100 kHz optional)
- Levels:
  - 1 Vrms ± 10% @ 50 ohms
- Harmonics:
  - < −50 dBc
- Spurious:
  - < −80 dBc
- Isolation:
  - $\Delta f/f < 1 \times 10^{-11}$ from no load to 50 ohms

TTL OUTPUT
- Frequencies:
  - 1, 5, 10 MHz or 100 kHz
- Level:
  - TTL, $Z_0 = 50$ ohms
- Duty Cycle:
  - 50% ± 5%
- Rise/Fall Time:
  - < or equal to 10 ns
- Jitter:
  - < 100 ps

POWER
- Line:
  - 115/320 ± 10% Vac
- Standby:
  - 22 to 56 Vdc ± ground

APPLICATIONS

- ☐ Regional Timing Network with centralized, remote synchronization
- ☐ Clock Systems
- ☐ Communications Systems
- ☐ Frequency and Aging Rate Measurements

FEATURES

- ☐ Cesium beam stability
- ☐ Nonmagnetic settability
- ☐ Can automatically match reference input frequency
- ☐ 1, 5 and 10 MHz sine outputs
- ☐ 1, 5, 10 and 0.1 MHz TTL outputs
- ☐ 1 PPS clock output
- ☐ 80-character liquid crystal display
- ☐ Calculates offset relative to reference input
- ☐ Calculates aging rate of reference
- ☐ Self-calibrating

OPTIONAL FEATURES

- ☐ IEEE-488 bus interface
- ☐ RS-232 interface
- ☐ Half-hour battery backup
- ☐ Custom output frequencies

SPECIFICATIONS (continued)

ENVIRONMENTAL
- Temperature:
  - 0°C to +50°C operating
  - −40°C to +60°C storage
- Humidity:
  - 0 to 95% non-condensing
- Altitude:
  - To 15,000 feet operating
  - To 40,000 feet storage

PERFORMANCE
- Nonmagnetic Settability:
  - 2×10^{-13}
- Settable Range:
  - $\pm 1 \times 10^{-10}$
- Battery Backup:
  - 30 minutes
- Accuracy:
  - $\pm 1 \times 10^{-11}$
- Long-term Stability:
  - $\pm 5 \times 10^{-12}$
- Reproducibility:
  - 5×10^{-12}
- Warm-up Time:
  - 30 minutes

FREQUENCY STABILITY
- Over Temp. Range (0°C to +50°C):
  - $< 7 \times 10^{-12}$
- Under DC Magnetic Field (2 gauss):
  - 2×10^{-12}
- Under AC Magnetic Field (2 gauss peak):
  - 2×10^{-12}
- In Altitude:
  - 2×10^{-12}

DIMENSIONS
- 8.75″H × 24″D × 17″W
- (Fits 19″ Rack)

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8100 SERIES OPTION SUMMARY

Time Code and Tape Search Instruments

OPTION	DESCRIPTION	APPLICABLE MODELS 8120	8132	8134	8152	8154	8155
	CODE OPTIONS						
C11	IRIG A (10 kHz) in lieu of IRIG B	●	●	●	●	●	●
C11Q	IRIG A (10 kHz) Output Code						●
C12Q	IRIG B (1 kHz) Output Code	*			*	*	●
C12A	IRIG A/B BINARY SECONDS: Adds 17-bit binary seconds to serial code format.	●			●	●	●
C12B	BINARY SECONDS: Converts from BCD and provides 17-bit binary seconds at parallel output.		●	●	●	●	●
C31	IRIG G (100 kHz) in lieu of IRIG B	●	●	●	●	●	●
C31Q	IRIG G (100 kHz) Output Code						●
C48	IRIG H (100 Hz) in lieu of IRIG B	●	●	●	●	●	●
C48Q	IRIG H (100 Hz) Output Code						●
C48A	IRIG H (1 kHz) in lieu of IRIG B	●	●	●	●	●	●
C48P	IRIG H (1 kHz) Output Code						●
C41	IRIG A/IRIG B Switch selectable (input code only for 8155)	●	●	●	●	●	●
C49	IRIG A, B, E (100 Hz or 1 kHz) and H (100 Hz or 1 kHz)	●	●	●	●	●	
C18	NASA 36-Bit (1 kHz) in lieu of IRIG B	●	●	●	●	●	●
C18Q	NASA 36-Bit (1 kHz) Output Code						●
C26	XR3 (250 Hz) in lieu of IRIG B	●	●	●	●	●	●
C26Q	XR3 (250 Hz) Output Code						●
C26A	XR3 (1 kHz) in lieu of IRIG B. (Also called 2137 Code.)	●	●	●	●	●	●
C26P	XR3 (1 kHz) Output Code. (Also called 2137 Code.)						●
C47	XR3 (250 Hz/1 kHz) Switch selectable in lieu of IRIG B	●	●	●	●	●	●
A12A	SLOW CODE: Type A Serial—Hours, minutes, seconds; 9 rates from 1 frame/second to 1 frame/hour.	●	●	●	●	●	●
A12B	SLOW CODE: Type B Serial—Days, hours, minutes, seconds; 9 rates from 1 frame/second to 1 frame/hour.	●	●	●	●	●	●
C50	WWVB CODE: Externally supplied, in lieu of IRIG B input code						●
	OSCILLATOR OPTIONS						
B11	CRYSTAL OSCILLATOR: Stability of ±4 parts in 10^9 for 20° change within 0° to +55°C; aging rate of ±5 parts in 10^{10}/24 hours.	●			●	●	●
B13	CRYSTAL OSCILLATOR: Stability of ±4 parts in 10^9 for 20° change within −20°C to +55°C; aging rate of ±1 part in 10^9/24 hours.	●			●	●	●
B14	ZERO WARM-UP CRYSTAL OSCILLATOR: Stability of ±5 parts in 10^7 from −40°C to +60°C; aging rate of ±1 part in 10^8/week at 22°C	●			●	●	●
B17	FLYWHEEL OSCILLATOR: Synchronizes to input carrier to provide time readings during brief loss of input code.		●	●	●	●	
	DAYS OPTIONS						
E13	DAYS/ID NUMBER: Adds three digits of days or ID number to code, display (8120, 8132, 8152) and start/stop times (8134, 8154).	●	●	●	●	●	
E20	DAYS: Adds three digits of days (leap year switch included) to generate and read modes and to display.						●

● = Option available.
* = Option standard at no additional charge.
Blank = Option not available/applicable.

8100 SERIES OPTION SUMMARY CON'T
Time Code and Tape Search Instruments

OPTION	DESCRIPTION	APPLICABLE MODELS 8120	8132	8134	8152	8154	8155
	TAPE SEARCH OPTIONS						
S17	SELECTABLE EARLY START: Provides pre-start command at 3, 5, 7, 9 or 11 time frames before tape start command.			●		●	
E14	MILLISECONDS START/STOP TIMES: Settable to 1 millisecond resolution.			●		●	
E19	SELECTABLE SEARCH: Allows searching for (1) days/ID number only, or (2) time-of-day only, or (3) time-of-year only. (Must include option E13.)			●		●	
E16	REMOTE SPEED SELECTION: Allows tape transport speed control from search unit.			●		●	
	TAPE SEARCH COMPUTER INTERFACE OPTIONS						
	DATA INPUT WORDS:						
	Start Time			●		●	
	Stop Time			●		●	
	Search Mode and Function Control			●		●	
	DATA OUTPUT WORDS:						
	Time on Demand			●		●	
	Status			●		●	
FC6H	Hours, minutes, seconds			●		●	
FC9H	Hours, minutes, seconds, milliseconds			●		●	
FC9D	Days, hours, minutes, seconds			●		●	
FC12D	Days, hours, minutes, seconds, milliseconds			●		●	
	TAPE SEARCH IEEE-488 INTERFACE OPTIONS						
	INPUT DATA STRING:						
	Start Time			●		●	
	Stop Time			●		●	
	Search Mode and Function Control			●		●	
	OUTPUT DATA STRING:						
	Time on Demand			●		●	
	Status			●		●	
FE6H	Hours, minutes, seconds			●		●	
FE9H	Hours, minutes, seconds, milliseconds			●		●	
FE9D	Days, hours, minutes, seconds			●		●	
FE12D	Days, hours, minutes, seconds, milliseconds			●		●	

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✱ = Option standard at no additional charge.
Blank = Option not available/applicable.

8100 SERIES ACCESSORIES
Time Code and Tape Search Instruments

PART NUMBER	DESCRIPTION
8198-4	BATTERY PACK: 4 ampere-hours, 19" rack mount, trickle and fast charge circuits.
8198-8	BATTERY PACK: 8 ampere-hours, 19" rack mount, trickle and fast charge circuits.
8198-12	BATTERY PACK: 12 ampere-hours, 19" rack mount, trickle and fast charge circuits.
1140453	CHASSIS SLIDES

8100 SERIES OPTION SUMMARY CON'T
Time Code and Tape Search Instruments

OPTION	DESCRIPTION	APPLICABLE MODELS 8120	8132	8134	8152	8154	8155
	TIME ON DEMAND OPTIONS						
D14-(X)	GROUP PARALLEL BCD OUTPUTS: Allows outputs to be gated in groups (bytes) up to a maximum of six bytes; single line control per byte. Specify byte size (D14-4 for a 4-bit byte; D14-8 for an 8-bit byte, etc.) 20-bit maximum for each D14 option.	●	●	●	●	●	●
D15	PARALLEL BCD OUTPUT: Hours, minutes and seconds	*	*	●	*	●	*
D15A	PARALLEL BCD OUTPUT: Days or ID number			●		●	
E14	PARALLEL BCD OUTPUT: Milliseconds	●	●		●	●	
E14A	PARALLEL BCD OUTPUT: Milliseconds			●		●	
D20	IEEE-488 INTERFACE: Hours, minutes and seconds	●	●	●	●	●	●
D21	IEEE-488 INTERFACE: Hours, minutes, seconds and milliseconds	●	●	●	●	●	●
D22	IEEE-488 INTERFACE: Days, hours, minutes and seconds	●	●	●	●	●	●
D23	IEEE-488 INTERFACE: Days, hours, minutes, seconds and milliseconds	●	●	●	●	●	●
D30	RS232 INTERFACE: Hours, minutes and seconds	●	●	●	●	●	●
D31	RS232 INTERFACE: Hours, minutes, seconds and milliseconds	●	●	●	●	●	●
D32	RS232 INTERFACE: Days, hours, minutes and seconds	●	●	●	●	●	●
D33	RS232 INTERFACE: Days, hours, minutes, seconds and milliseconds	●	●	●	●	●	●
	INPUT/OUTPUT SIGNAL OPTIONS						
S11	SYNCHRONIZATION, EXTERNAL: Starts clock with external pulse. Includes ADVANCE/RETARD control.	●			●	●	●
S11A	SYNCHRONIZATION, WWV: Starts clock with external WWV tick pulse. Includes WWV tick filter, ADVANCE/RETARD controls and propagation delay control.	●			●	●	●
S12	PROPAGATION DELAY CONTROL						●
A21	COMPUTER READ COMMAND: Supplies inhibit signal during time update.	●	●	●	●	●	●
A16	CONTROL BIT INSERTION: 45 bits (one A16 option for each 8155 output code)	●			●	●	●
A16C	CONTROL BIT TRANSLATION: 45 bits, includes parallel outputs.		●	●	●	●	●
A16D	CONTROL BIT TRANSLATION AND LED DISPLAY: 45 bits, includes parallel outputs.		●	●	●		●
	GENERATION OPTIONS						
E17	SIMULTANEOUS GENERATE/READ: Hours, minutes and seconds				●	●	
E17A	SIMULTANEOUS GENERATE/READ: Days, hours, minutes and seconds				●	●	
E22	GENERATE PRESET AND CONTROL: Hours, minutes and seconds						●
E22A	GENERATE PRESET AND CONTROL: Days, hours, minutes and seconds (Must include Option E20.)						●
	POWER SUPPLY OPTIONS						
L13	AC/DC POWER SUPPLY: 115/230 Vac or +20 to +50 Vdc operation with automatic switchover and switchback.	●	●	●	●	●	●
	ANALOG FILTER OPTIONS						
S13	ANALOG FILTERS, LOCAL: Search and reproduce speeds. Front panel bandpass selector.		●	●	●	●	
S14	ANALOG FILTERS, REMOTE: Same as S13 but allows remote and programmable bandpass selection.		●	●	●	●	

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MODEL 5581/5582

SINGLE-LINE READOUT DISPLAY

GENERAL

The Austron Model 5581 Single-Line Readout Display is a nine-digit time display. The Model 5582 is a five-digit display. The nine-digit display shows days, hours, minutes and seconds; the five-digit display shows total seconds in a day. Either display can read a standard IRIG A or IRIG B time code signal and has count-up, count-down capability using CFE 10 and 11. Both displays have leading zero blanking. The days, hours, minutes, seconds (nine-digit) display has days blanking as a user option. The displays have compensation for leap year. The bright orange gas discharge display segments are visible over long distances.

SPECIFICATIONS

ELECTRICAL
- Power Input Voltage: 115/230 Vac ±10%, 50 to 400 Hz
- Power: ≤20 watts
- Signal Input Level: 1 to 10 Vpp
- Signal Format: IRIG A or IRIG B
- Input Impedance: >100 kilohms
- Output: 2-inch gas planar display

PHYSICAL
- Dimensions: 4.5"H × 30"W × 9"D
- Weight: 5 lbs., 5.5 oz.
- Design Stacking Limit: 3 instruments
- Signal I/O Connectors: Rear BNC
- Power Connectors: IEC male and female recepticles

APPLICATIONS

- ☐ For use in applications requiring visibility at a great distance
- ☐ Space and missle tracking centers
- ☐ Communications centers
- ☐ Game shows

FEATURES

- ☐ Days blanking
- ☐ Leap year compensation
- ☐ Compatible with standard IRIG A or IRIG B codes
- ☐ Count-up, count-down capability, using CFE 10 and 11

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MODEL 8110

TIME CODE DIGITAL CLOCK

GENERAL

Austron 8110 Time Code Digital Clocks are designed for use as flexible system modules in any application where real or elapsed time must be maintained for control, recording or indication purposes.

Ten different standard time readouts are available and nearly any other time readout may be ordered as an optional feature. All time displays utilize in-line planar readouts mounted behind a polarized filter to reduce glare.

AC line frequency is used as a time base for long term stability. Three optional crystal controlled oscillators are offered as well as a number of synchronization and control options.

SPECIFICATIONS

TIME BASE: 60 Hz External 1 PPS time base provisions included. See OPTIONS for crystal controlled time base options.

INPUTS:

External Time Base: Accepts 1 PPS pulse from 0 to +5 V (nominal). Standard TTL logic compatible. (If Option B11, B12 or B13 is added, external time base is 1 MHz.)

Elapsed Time Command: 0 V or ground condition will hold time advance. Unit resumes accumulating time upon release of command.

Update Inhibit Command: 0 V or ground condition will inhibit time advance without time loss for up to 700 milliseconds. Upon release, clock automatically updates to correct time.

Remote Control: 0 V or ground condition will allow remote control of the following conditions: PRESET, RESET (to zero), STOP.

OUTPUTS:

Parallel BCD Outputs: Four BCD lines per time element. (If Option B11, B12 or B13 is added, 12 additional lines of milliseconds are available.)

Code: 8-4-2-1

Logic: Binary "1" = +5 V (±0.5), 6 kΩ source
Binary "0" = 0 V (±0.5), 12 mA sink

Connector: Amphenol 57-40500, mating connector supplied.

Pulse Rate Outputs: 10 PPS, 1 PPS, 0.1 PPS, 1 PPM, 0.1 PPM and 1 PPH rate outputs are provided. All pulse outputs are positive (0 to +5 V, nominal, 6 kΩ source) with leading edge "on time." Connector is amphenol 57-40140, mating connector supplied.

(Specifications continued on page 2.)

FEATURES

- ☐ Real or elapsed time modes
- ☐ Thumbwheel time setting for permanent visual indication of start time
- ☐ Systems and computer interface provisions
- ☐ Update inhibit
- ☐ Parallel BCD outputs; 6 simultaneous pulse rates

OPTIONAL FEATURES

- ☐ WWV synchronization
- ☐ High stability oscillators
- ☐ AC/DC power option
- ☐ Coincidence output circuit

SPECIFICATIONS 8110 Continued

MANUAL CONTROLS:

Mode:	Rotary switch to select POWER OFF, STOP, HOLD, RUN and REMOTE.
Time Set:	Thumbwheel switches to select initial start time.
Preset/Reset:	Momentary toggle switch to preset selected start time or reset to zero.
Time Base:	Rear panel switch selects internal or external time base.
Days/ID Number:	With Option E13 a rear panel switch selects whether additional 3 digits are to be used as days (updates automatically every 24 hrs.) or as ID number (set manually, can be updated remotely). Includes Leap Year switch position.

PHYSICAL:

Environment:	0°C to +50°C at up to 95% relative humidity.
Power:	115/230 V (±10%), 60 Hz. If crystal oscillator is included (Option B11, B12 or B13), unit may be operated at power line frequencies from 48 to 440 Hz, 30 watts nominal.
Dimensions:	3½ "H × 19"W × 17"D (8.9 × 48.3 × 43.2 cm). Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify.)
Weight:	Approx. 23 lbs. net (10.4 kg); 35 lbs. shipping (15.9 kg).

OPTIONS:

A17:	Coincidence Output at Preset time (6 digits).
A17A:	Coincidence Output at Preset time (8 or 9 digits).
A17B:	Coincidence Output at Preset time, adds millisecond resolution and must include Option B11, B12 or B13 (9 digits).
A17C:	Coincidence Output at Preset time, adds millisecond resolution and must include Option B11, B12 or B13 (11 or 12 digits).
A21:	Computer READ command.
B11:	Crystal oscillator with stability of ±4 parts in 10^9 for 20°C change within 0° to +55°C. Aging rate of ±5 parts in 10^{10}/24 hrs.
B12:	Crystal oscillator with stability of ±1 part in 10^5 within 0° to +60°C; aging rate of ±1 part in 10^7/24 hrs.
B13:	Crystal oscillator with stability of ±4 parts in 10^9 over 20° change within −20°C to +55°C; aging rate of ±1 part in 10^9/24 hrs.
D14-X:	Group parallel BCD outputs (specify byte size).
E13:	Days/ID number (switch selectable). Counts to 365/366 days, 23 hrs: 59 min: 59 sec. Resets to 001 days, 00 hrs: 00 min: 00 sec. ID number operation from 000 to 999.
E25:	Calendar clock: counts to month, day: 23 hrs: 59 min: 59 sec.
L13:	AC/DC power supply with automatic switchover.
S11:	External synchronization (must also include Option B11, B12 or B13).
S11A:	Full WWV synchronization, includes propogation delay compensation (must also include Option B11, B12 or B13).

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MODEL 8120

TIME CODE GENERATOR

GENERAL

The Model 8120 Time Code Generator is a precise digital clock which generates a serial time code for recording a time reference on magnetic tape or for timing distribution applications.

The standard unit generates a modified IRIG B format in terms of hours, minutes and seconds. In addition to the modulated code, the 8120 simultaneously generates a DC level shift output plus four precisely controlled pulse rates. Updated time is supplied as parallel BCD outputs with DTL/TTL compatible logic levels.

Initial clock start time is preset from front panel thumbwheel switches and time is displayed on a large, in-line planar readout.

The Model 8120 uses monolithic integrated circuits throughout. Circuitry is mounted on plug-in cards. Like all 8100 Series instruments, the Model 8120 is in a universal package suitable for either rack or bench mounting.

The standard IRIG B code may be replaced with any one of a number of formats from the IRIG, NASA or XR3 code families. A universal IRIG option is available which allows switch selection of IRIG A, B, E and H formats.

For precision timekeeping requirements, the 8120 can be supplied with an ultra-high stability oscillator and external synchronization capability.

SPECIFICATIONS

TIME BASE: Crystal controlled oscillator with stability of ±1 part in 10^5 within 0° to +60°C; aging rate of ±1 part in 10^7/24 hrs. Provisions included for use of an external 1 MHz time base.

INPUTS:

External Time Base: Accepts a 1 MHz input at 1 Vpp (nominal) into 1 KΩ via a rear panel BNC-type connector. Switch selects internal or external time base.

Elapsed Time Command: 0 V level or ground condition inhibit time advance. Unit resumes counting upon release of command.

OUTPUTS: (All circuits are short circuit proof to ground)

Modulated Code: The modulated code is generated on a precise 1 kHz carrier with an adjustable amplitude from 0 to 10 Vpp from a low impedance 15 mA peak source and an adjustable modulation ratio (mark-to-space) from 2:1 to 6:1. Connector is rear panel BNC type.

Code Format: Modified IRIG B format in terms of hours, minutes and seconds (days/ID number optional).

DC Level Shift Code: The DC level shift code is generated with an adjustable amplitude from +1 to +10 V into a 600 Ω load. The connector is a rear panel BNC type.

(Specifications continued on page 2.)

FEATURES

- ☐ Real or elapsed time modes
- ☐ Pulse rate outputs
- ☐ DC level shift code output
- ☐ Thumbwheel time setting
- ☐ Parallel BCD outputs

OPTIONAL FEATURES

- ☐ Universal IRIG code capability
- ☐ WWV synchronization
- ☐ Ultra-high stability oscillator
- ☐ Remote programming
- ☐ Slow code outputs; 9 selectable rates
- ☐ Computer interface provisions

SPECIFICATIONS 8120 Continued

Pulse Rates: Simultaneous rates of 1 PPS, 10 PPS, 100 PPS and 1 KPPS are provided with leading edge "on time." Levels are 0 to +5 V (nominal), 6 kΩ source (TTL compatible). Connector is amphenol 57-40140, mating connector supplied.

Display: Six digit in-line planar readout to indicate time-of-day or elapsed time in hours, minutes and seconds (3 additional digits if days/ID number option is included).

Optional Parallel BCD Outputs: Updated time is provided as 20 parallel BCD lines representing hours, minutes and seconds (12 additional lines for days/ID number or milliseconds optional).

- Code: 8-4-2-1
- Logic: Binary "1" = + 5 V (±0.5), 6 kΩ source
  Binary "0" = 0 V (±0.5), 12 mA sink
- Connector: Amphenol 57-40500, mating connector supplied.

MANUAL CONTROLS:

Mode: Rotary switch selects POWER OFF, STOP, HOLD and GENERATE.

Time Set: Six thumbwheel switches for setting initial start time in hours, minutes and seconds (3 additional thumbwheels for days/ID number optional).

Preset/Reset: Momentary toggle switch to preset selected time or to reset time to zero. When days/ID number option is included, day or ID number may be changed without interrupting time accumulation.

Time Base: Rear panel switch to select internal or external time base.

PHYSICAL:

Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz, 30 watts nominal.

Dimensions: 3½"H × 19"W × 17"D (8.9 × 48.3 × 43.2 cm). Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify).

Weight: Approx. 23 lbs. net (10.4 kg); 35 lbs. shipping (15.9 kg).

OPTIONS: See 8100 Series Option Summary for available options.

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MODEL 8132

TIME CODE READER

GENERAL

The Model 8132 Time Code Reader, as with all of the 8100 Series instruments, uses proven monolithic integrated circuits and highly reliable, all-silicon solid state components. Modular plug-in construction is used throughout.

Model 8132 is designed to translate an IRIG B modulated time code format in terms of BCD hours, minutes and seconds. Day-of-year or ID number will be read optionally. Additional options allow reading any one of standard IRIG, NASA or XR3 code formats in place of IRIG B. A universal IRIG unit is available which will read IRIG A, B, E and H code formats by front panel switch selection.

Decoded time information is supplied as parallel BCD information for use with a digital recorder or for computer interface applications. Four precisely controlled pulse rate outputs are also included.

Updated time is displayed on an in-line planar readout in terms of hours, minutes and seconds (day-of-year or ID number optional).

SPECIFICATIONS

INPUTS:

Modulated Code: Accepts modulated code with carrier frequency from 30 Hz to greater than 500 kHz. Unit will read codes with amplitude from 50 mV to 50 Vpp and with modulation ratio from 2:1 to 6:1. Input impedance 100 kΩ minimum. Connector is rear panel BNC type.

Update Inhibit Command: 0 V or ground condition will inhibit time advance without time loss for up to .5 milliseconds. Upon release of command, reader will automatically update to correct time.

OUTPUTS:

Pulse Rates: Simultaneous rates of 1 PPS, 10 PPS, 100 PPS and 1 KPPS are provided with the leading edge "on time." Levels are 0 to +5 V (nominal), 6 kΩ source (TTL compatible). Connector is amphenol 57-40140, mating connector supplied.

Parallel BCD Outputs: Updated time is provided as 20 parallel BCD lines representing hours, minutes and seconds (12 additional lines for days/ID number or milliseconds options available).

Code: 8-4-2-1

Logic: Binary "1" = +5 V (±0.5), 6 kΩ source
Binary "0" = 0 V (±0.5), 12 mA sink

Connector: Amphenol 57-40500, mating connector supplied.

(Specifications continued on page 2.)

FEATURES

- ☐ Parallel BCD outputs
- ☐ Pulse rate outputs; 1 PPS to 1000 PPS
- ☐ Reads input code in forward and reverse directions
- ☐ Error bypass and digital filtering
- ☐ Wide range input accepts time codes from 50 mV to 50 Vpp

OPTIONAL FEATURES

- ☐ Universal IRIG code capability
- ☐ Slow code outputs for graphic recorder visual display; 9 selectable rates
- ☐ Analog filters
- ☐ Flywheel oscillator

SPECIFICATIONS 8132 Continued

CODE FORMAT:	IRIG B. Other codes optional.
DIRECTION:	Forward or reverse tape direction selected by front panel switch.
ERROR BYPASS:	0 or 3 frames of error bypass in forward direction via mode switch.
DISPLAY:	Six digit in-line planar readout to indicate incoming code time in hours, minutes and seconds (3 additional digits if days/ID number option is included).
PHYSICAL:	
Environment:	0°C to +50°C at up to 95% relative humidity.
Power:	115/230 V (±10%), 48 to 440 Hz, 50 watts nominal.
Dimensions:	3½ "H × 19"W × 17" D (8.9 × 48.3 × 43.5 cm). Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify).
Weight:	Approx. 23 lbs net (10.4 kg); 35 lbs. shipping (15.9 kg).
OPTIONS:	See 8100 Series Option Summary for available options.

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MODEL 8134

TIME CODE READER/ TAPE SEARCH AND CONTROL UNIT

GENERAL

The Austron Model 8134 is a complete time code reader and tape search unit combined into a 3½ inch high panel instrument. As a time code reader, the unit decodes the incoming code during data playback in forward or reverse directions. When the 8134 is used as a tape search and control unit, it will accept a serial time code input and search the recorded data for a preset time interval.

Switch selectable error bypass incorporating digital filtering overcomes inconsistencies in the incoming code structure. Three front panel lights offer visual indications of tape time in relation to the preset start and stop switches. The 8134 also provides full remote control of the tape transport.

The standard 8134 searches a modified IRIG B code format in terms of BCD hours, minutes and seconds. Optional features are: parallel BCD outputs, search to millisecond resolution, 9 selectable slow code rates for graphic recorders or visual displays, 11 position analog bandpass filters for both playback and search speeds, IRIG, NASA and XR3 code families, and computer interface.

The Model 8134 combines the basic elements of other timing units into one, simple-to-operate unit.

SPECIFICATIONS

TIME CODE READER:

Code Format:	IRIG B. Other codes available optionally.
Display:	Six digit in-line planar readout to indicate incoming code time in hours, minutes and seconds (3 additional digits if days/ID number option included).
Modulated Code Input:	Accepts modulated code with carrier frequency from 30 Hz to greater than 500 kHz. Unit will read codes with amplitude from 50 mV to 50 Vpp and with modulation ratio from 2:1 to 6:1. Input impedance is 100 kΩ, minimum. Connector is rear panel BNC type.
Forward/Reverse:	Forward or reverse tape direction selected by front panel controls.
Error Bypass:	Toggle switch selects 0 or 3 bypass frames in forward direction.
Pulse Rate Outputs:	Simultaneous pulse rates of 1 PPS, 10 PPS, 100 PPS and 1 KPPS are provided with leading edge "on time." Levels are 0 to +5 V (± .5 V) nominal, from a 6 kΩ source. Connector is rear panel amphenol 57-40360, mating connector supplied.

TAPE SEARCH:

Transport Control:	Control panel includes back-lit pushbuttons for remote control of the following transport functions:
Forward:	Drives the transport in the forward direction at fast search speed.
Reverse:	Drives the transport in reverse direction at fast search speed.
Drive:	Drives the transport in the forward direction at the selected drive speed.
Stop:	Stops transport.

(Specifications continued on page 2.)

FEATURES

- ☐ Full tape search capability in 3½ inches of panel space
- ☐ Reliable decoding in forward and reverse directions
- ☐ Wide range input accepts codes from 50 mV to 50 Vpp
- ☐ Switch selectable error bypass with digital filtering
- ☐ "Less than" or "greater than" search comparison

OPTIONAL FEATURES

- ☐ 11 position bandpass filters for both playback and search
- ☐ Slow code output for graphic recorders
- ☐ Switch selectable IRIG A (10 kHz) or IRIG B (1 kHz)
- ☐ Search to 3 digits of days/ID number, time-of-day or time-of-year.

SPECIFICATIONS 8134 Continued

Operating Modes:	The above Transport Control functions may be operated manually or automatically depending upon which of the following operating modes is selected:
Automatic Modes:	
Search To Start:	Searches at high speed to the selected start time and stops transport at least 3 time frames before the start time frame.
Single Cycle:	Searches to the selected start time at fast or controlled search speed. Reproduces the selected time segment at playback speed until reaching selected stop time.
Recycle:	Same as Single Cycle except that upon reaching stop time, it will again search for start time and continuously repeat cycle until stop button is pressed.
Manual Search Mode:	Allows transport to be driven in the forward or reverse direction for manually searching tape. Tape time can be read on the reader unit.
Outputs:	All dc logic levels are 0 to +5 V (nominal) from a 6 kΩ source. Momentary (100 ms approx.) or continuous Form C closure commands will be supplied as required by the tape transport to be controlled or as specified by user.
Automatic Mode Status Signals:	A dc logic level is provided continuously beginning at selected start time and terminating at selected stop time. A start pulse is provided at start time and a stop pulse at stop time. Early start level provided prior to selected start time and continues to selected stop time.
PHYSICAL:	
Environment:	0°C to +50°C at up to 95% relative humidity.
Power:	115/230 V (±10%), 48 to 440 Hz, 55 watts nominal.
Dimensions:	3½ "H × 19"W × 17" D (8.9 × 48.3 × 43.5 cm). Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify).
Weight:	Approx. 23 lbs net (10.4 kg); 35 lbs. shipping (15.9 kg).
OPTIONS:	See 8100 Series Option Summary for available options.

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MODEL 8152

TIME CODE GENERATOR/ READER

GENERAL

The Austron Model 8152 is a complete time code generator and tape reader unit, all combined into a 3½ inch high panel instrument. As a time code generator, the 8152 is a precise digital clock which also generates a serial modulated and dc level shift code for use in time indexing during data acquisition. As a time code reader, the unit decodes the incoming code during data playback in both the forward and reverse directions.

A switch selectable error bypass circuit incorporating digital filtering overcomes brief inconsistencies in the incoming code structure.

The standard 8152 generates and reads an IRIG B code format in BCD hours, minutes and seconds (day-of-year or ID number are optional).

SPECIFICATIONS

TIME BASE:

Generate Mode: Crystal controlled oscillator with a stability of ±1 part in 10^5 within 0° to +60°C and an aging rate of ±1 part in 10^7/24 hrs. Provisions included for use of external 1 MHz time base.

DISPLAY

Generate and Read Modes: 6 digit in-line planar readout to indicate time-of-day or elapsed time in hours, minutes and seconds (3 additional digits if days/ID number option is included) in Generate Mode, or incoming code time in Read Mode.

CODE FORMAT:

Read Mode: Reads IRIG B format in terms of hours, minutes and seconds (days/ID number optional).

Generate Mode: Generates modified IRIG B format in terms of hours, minutes and seconds (days/ID number optional).

OUTPUTS: (All outputs are short circuit proof to ground)

Modulated Code:

Generate Mode: The modulated code is generated on a 1 kHz carrier with an adjustable amplitude from 0 to 10 Vpp from a low impedance 15 mA peak source and an adjustable modulation (mark-to-space) ratio from 2:1 to 6:1. Connector is rear panel BNC type.

DC LEVEL SHIFT CODE:

Generate and Read Modes: The dc level shift code is generated with an adjustable amplitude from +1 to +10 V into a 600 ohm load. Connector is rear panel BNC type.

(Specifications continued on page 2.)

FEATURES

- ☐ Reliable decoding of incoming time codes
- ☐ Wide range input accepts time codes from 50 mV to 50 Vpp.
- ☐ Switch selectable error bypass incorporating digital filtering for dropouts in the incoming code structure

OPTIONAL FEATURES

- ☐ 11 position bandpass filters
- ☐ 9 selectable slow code rates for graphic recorders or visual displays
- ☐ 3 digits of days/ID information
- ☐ WWV synchronization

SPECIFICATIONS 8152 Continued

PULSE RATES:

Generate and Read Modes: Simultaneous rates of 1 PPS, 10 PPS, 100 PPS and 1 KPPS are provided with leading edge "on time." Levels are 0 to +5 V (±.5 V) nominal from a 6 kΩ source.

PARALLEL BCD OUTPUTS:

Generate and Read Modes: Updated time is provided as 20 parallel BCD lines representing hours, minutes and seconds (12 additional lines for days/ID number or milliseconds optional).

Code: 8-4-2-1

Logic: Binary "1" = +5 V (±0.5), 6 kΩ source
Binary "0" = 0 V (±0.5), 12 mA sink

Connector: Amphenol 57-40500, mating connector supplied.

MODULATED CODE INPUT:

Read Mode: The input modulated code will be accepted with a carrier frequency from 30 Hz to greater the 500 kHz at levels from 50 mV to 50 Vpp and with a modulation ratio from 2:1 to 6:1. Input impedance is 100 kΩ minimum. Connector is rear panel BNC type.

MANUAL CONTROLS:

Direction: Forward or reverse tape direction selected by front panel control.

Error Bypass: Mode switch selects 0 or 3 error bypass frames in forward direction.

Time Set: Six thumbwheel switches for setting initial start time in hours, minutes and seconds (3 additional thumbwheels for days/ID number optional).

Preset/Reset: Momentary toggle switch to preset selected time or reset to zero.

Mode: Switch to select POWER OFF, STOP, HOLD, GENERATE and READ 0E and READ 3E.

PHYSICAL:

Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz, 50 watts nominal.

Dimensions: 3½"H × 19"W × 17"D (8.9 × 48.3 × 43.5 cm) Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify).

Weight: Approx. 23 lbs. net (10.4 kg); 35 lbs. shipping (15.9 kg).

OPTIONS: See 8100 Series Option Summary for available options.

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MODEL 8154

TIME CODE GENERATOR/ READER/ TAPE SEARCH & CONTROL UNIT

GENERAL

The Austron Model 8154 is a complete time code generator and tape search system in a single 3½ " high package. As a time code generator, the 8154 is a precise digital clock that generates a serial time code for indexing magnetic tape during data acquisition. During playback the unit decodes the time information and provides automatic search control to locate and retrieve selected segments of tape data.

During reading or search operation the incoming time code can be accepted in either the forward or reverse direction over a wide range of signal level and carrier frequencies.

Front panel thumbwheel switches select the initial clock time in the generate mode and also serve to set the desired start and stop times during tape search operation.

SPECIFICATIONS

TIME BASE:

Generate Mode: Crystal controlled oscillator with a stability of ±1 part in 10^5 within 0°C to +60°C and an aging rate of ±1 part in 10^7/24 hrs. Provisions included for use of external 1 MHz time base.

DISPLAY:

Generate and Read Modes: Six digit in-line planar readout to indicate time in hours, minutes and seconds (3 additional digits if days/ID number option is included).

Time Set: Thumbwheel switches for setting initial start time. Toggle switch to preset time into clock registers.

CODE FORMAT:

Generate and Read Modes: IRIG B hours, minutes and seconds (days/ID number available as an option). Other codes also available.

OUTPUTS:

Modulated Code:

Generate Mode: Precise 1 kHz carrier with adjustable amplitude from 0 to 10 Vpp from a low impedance 15 mA peak source. Modulation ratio adjustable from 2:1 to 6:1. Connector is rear panel BNC type.

DC Level Shift Code:

Generate and Read Modes: +1 to +10 V into 600 ohms. Connector is rear panel BNC type.

Pulse Rates:

Generate and Read Modes: Simultaneous rates of 1 PPS, 10 PPS, 100 PPS and 1 KPPS are provided with leading edge "on time." Levels are 0 to +5 V (±.5 V) from a 6 kΩ source (TTL compatible). Connector is amphenol 57-40360, mating connector supplied.

FEATURES

- ☐ Unique time frame validation technique
- ☐ Wide range input circuit reads codes from 50 mV to 50 Vpp
- ☐ Switch selectable error bypass with digital filtering
- ☐ "Less than" or "greater than" search comparison

OPTIONAL FEATURES

- ☐ Serial slow code outputs
- ☐ Parallel BCD outputs
- ☐ Analog filters
- ☐ Multiple code formats
- ☐ Computer interface

SPECIFICATIONS 8154 Continued

Modulated Code Input:

Read Mode: Accepts modulated code with carrier frequency from 30 Hz to greater than 500 kHz with levels from 50 mV to 50 Vpp and modulation ratio from 2:1 to 6:1. Input impedence is 100 kΩ minimum. Rear panel BNC type connector.

TAPE SEARCH:

Transport Control: The control panel includes back-lit pushbuttons for remote control of the following transport functions:

- Forward: Drives the transport in the forward direction at fast search speed.
- Reverse: Drives the transport in the reverse direction at fast search speed.
- Drive: Drives the transport in the forward direction at the selected drive speed.
- Stop: Stops transport.

Operating Mode: The above transport functions may be operated manually or automatically depending upon which of the following operating modes is selected.

Automatic Modes:

Search To Start: Searches at high speed to the selected start time and stops transport at least 3 time frames before the start time frame.

Single Cycle: Searches to the selected start time at fast or controlled search speed. Reproduces the selected time segment at playback speed until reaching selected stop time.

Recycle: Same as Single Cycle except that upon reaching stop time, it will again search for start time and continuously repeat cycle until STOP button is pressed.

Manual Search Mode: Allows transport to be driven in the forward or reverse direction at a controlled speed for manually searching tape. Tape time can be read on the reader unit.

Outputs: All hard closures are rated at 3 amperes at 30 Vdc or 120 Vac (resistive load). All dc logic levels are 0 to +5 V (±.5 V) nominal from a 6 kΩ source. Momentary (approx. 100 ms) or continuous Form C closure commands will be supplied as required by tape transport to be controlled or as specified by user.

Automatic Mode Status Signals: DC logic level is provided continuously beginning at selected start time and terminating at selected stop time. A start pulse is provided at start time and a stop pulse at stop time. Early start level provided prior to selected start time and continues to selected start time and continues to selected stop time.

PHYSICAL:

Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz, 60 watts nominal.

Dimensions: 3½"H × 19"W × 17"D (8.9 × 48.3 × 43.5 cm). Rack mount configuration standard, chassis drilled for rack slides (for bench mount configuration, please specify).

Weight: Approx. 23 lbs. net (10.4 kg); 35 lbs. shipping (15.9 kg).

OPTIONS: See 8100 Series Option Summary for available options.

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MODEL 8155

SYNCHRONIZED TIME CODE GENERATOR

GENERAL

The Austron Model 8155 combines the functions of a time code generator nd a real time time code reader in a single 3½" high instrument. The unit lecodes the incoming serial time code and uses this information to syn- :hronize the time code generator, which regenerates parallel BCD synchro- iized with the incoming signal. Options include capability to synchronize up to serial outputs (IRIG, NASA and XR-3) to input signal.

During normal operation (input code present) the Model 8155 will output arallel BCD in synch with the incoming code.

Under abnormal conditions (bit error loss or loss of input code) the 8155 everts to its internal time base for control and continues to output all serial nd parallel time information. A front panel light alerts the operator to this ondition. When the instrument verifies the return of the input code by lecoding three consecutive valid time frames, control automatically reverts ack to the external input signal.

The wide range, reliable input circuitry and variety of options available for his instrument make it invaluable in areas where marginal or inconsistent time ode signals are used for recording or transmission.

FEATURES

- ☐ IRIG B input code standard
- ☐ Signal input meter
- ☐ Wide dynamic range AGC, −27 dBm to +20 dBm
- ☐ Dropout detector
- ☐ Plug-in, modular construction
- ☐ Unique three consecutive valid time frame verification

OPTIONAL FEATURES

- ☐ Up to 5 simultaneous serial code outputs
- ☐ High stability oscillator
- ☐ Computer interface—straight binary time outputs
- ☐ DC power operation
- ☐ Full synchronization with phase lock frequency correction of internal oscillator
- ☐ Independent operation as a time code generator

SPECIFICATIONS

IME BASE
Crystal controlled oscillator with stability of ±1 part in 10^5 within 0°C to +60°C and an aging rate of ±1 part in 10^7/24 hrs. Provisions included for use of external 1 MHz time base.

ISPLAY
6 digit in-line planar readout to indicate time-of-day in hours, minutes and seconds (days option adds 3 digits).

YNCHRONIZATION:
All outputs (parallel and serial) are synchronized to the "on time" mark of the incoming code.

NPUTS:

Modulated Code: (Synch Mode) Specifications for the real time read mode are as follows (forward only):

- Carrier: IRIG B hours, minutes, seconds. Other codes available optionally.
- Amplitude: 100 mV to 21 Vpp (−27 dBm to +20 dBm)
- Modulation Ratio: 2:1 to 6:1
- Input Impedance: 600 ohms balanced (100 kΩ optional)

External Time Base: Generate and Synch Modes: Accepts 1 MHz input at 1 Vpp (nominal) into 1 kΩ. Connector is rear panel BNC type.

Specifications continued on page 2.)

SPECIFICATIONS 8155 Continued

OUTPUTS: (All outputs are short circuit proof to ground.)

Optional DC Level Shift Code: One output provided per selected modulated code format. Adjustable from +1 to +10 V into 600 ohm load. Connector is rear panel BNC type.

Optional Modulated Code: Adjustable from 0 to 10 Vpp from a low impedance 15 mA source with adjustable ratio from 2:1 to 6:1. Connector is rear panel BNC type. Specify desired code formats from Option Summary.

Parallel BCD Outputs: 20 parallel lines representing hours, minutes and seconds (days and/or milliseconds optional)
Code: 8-4-2-1
Logic: Binary "1" = +5 V (±0.5), 6 kΩ source
Binary "0" = 0 V (±0.5), 12 mA sink

Pulse Rates: 1 PPS, 10 PPS, 100 PPS and 1000 PPS with leading edge "on time."

OPTIONAL TIME PRESET AND GENERATE (E22 or E22A):

E22 requires six thumbwheel switches for selecting initial start time in hours, minutes and seconds (E22A requires 3 additional thumbwheels with Days/E20 option installed). Momentary toggle switch to preset initial start time for stand-alone operation.

CONTROL: Rotary switch selects POWER OFF, STOP, HOLD, OPERATE.

PHYSICAL:

Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz, 55 watts nominal.

Dimensions: 3½"H × 19"W × 17"D (8.9 × 48.3 × 43.2 cm) Rack mount configuration standard. Chassis drilled for rack slides, (for bench mount configuration please specify).

Weight: Approx. 23 lbs. net (10.4 kg); 35 lbs. shipping (15.9 kg).

OPTIONS: See 8100 Series Option Summary for available options.

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MODEL 8181

SINGLE LINE READOUT/DISPLAY

GENERAL

The 8181 displays can be supplied to operate directly from any time code generator supplying an IRIG A or IRIG B modulated time code. The 8181 converts the serial information into parallel form which is displayed and is available optionally as parallel BCD information.

These displays are particularly valuable where time must be displayed at points widely separated with the advantages of running a single line as opposed to 20 or more parallel lines of BCD information.

In-line readout indicators are mounted behind a polarized filter to reduce glare. Display indicators are provided with a character height of one inch and a rated viewing distance of 50 feet.

Each display includes two rear panel BNC connectors. One is the input to the display. The second connector is in parallel to the input connector to allow driving multiple displays in a chain. The display includes a self-contained power supply and requires no external power from the driving device.

SPECIFICATIONS

NPUT
:ODE FORMAT: Accepts single line input of serial code in IRIG A or IRIG B format. Other codes available optionally. A modulated code can be accepted in the forward direction with a carrier frequency from 80 Hz to 12 kHz with modulation ratio (mark-to-space) between 2:1 and 6:1. Input level of −20 dBm to +10 dBm (0.25 to 7.5 Vpp) can be decoded. The input is floating and has an infinite DC input resistence. Provision for line termination available.

UTPUT: (optional) Parallel BCD output is available to provide updated time-of-day or time-of-year.
Code: 8-4-2-1
Logic: Binary "1" = +5 V (±0.5), 6 kΩ source
Binary "0" = 0 V (±0.5), 12 mA sink

HYSICAL:
Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz, 15 watts nominal.

Dimensions: 3½"H × 19"W × 9½"D (8.9 × 48.3 × 24.1 cm)
Rack mount configuration standard. (For bench mount configuration, please specify).

Weight: 7 lbs. net (3.2 kg); 9 lbs. shipping (4.1 kg).

FEATURES

- ☐ Accepts both IRIG A and IRIG B serial inputs
- ☐ Single pair input/output for low cabling cost
- ☐ Low loading. One source drives many displays.
- ☐ 6-digit planar readout

OPTIONAL FEATURES

- ☐ C18: NASA 36-Bit code, in lieu of IRIG
- ☐ C26: XR3 (250 Hz) code, in lieu of IRIG
- ☐ C26A: XR3 (1 kHz) code, in lieu of IRIG
- ☐ D11: BCD Output, parallel. Hours, minutes, seconds.
- ☐ D11D: BCD Output, parallel. Days, hours, minutes, seconds.
- ☐ E13: Days. Adds three digits to display.
- ☐ M16: Mounting yoke, ceiling/wall.

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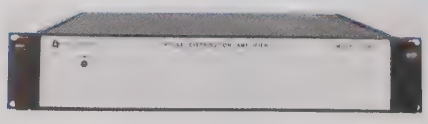
MODEL 8190A



PULSE DISTRIBUTION AMPLIFIER

GENERAL

The Austron Model 8190A Pulse Distribution Amplifier is designed for applications requiring distribution of pulse rates from 1 pps to 5M pps. Card cage construction allows flexibility to configure the I/O to meet customer requirements.

The 8190A has 36 rear panel BNC connectors; 4 for inputs and 32 for outputs. Each output is independently buffered and adjustable.

The Quad Input Buffer board follows the incoming signal, maintaining the characteristics (duty cycle) of the pulse and, via one of four signal busses, drives one or more Quad Output Buffer boards. The output board provides the drive and level capabilities to provide 4 outputs. Up to 32 outputs can be provided from a single input.

SPECIFICATIONS

ELECTRICAL

Inputs: 1 pps to 5M pps from 1.5 to 10 vpk

Outputs: 1 pps to 5M pps (follows input) adjustable from 0.5 to 5 vpk with 50 ohm impedance. The output pulse duty cycle mirrors the input pulse duty cycle with rise time (from 10 to 90 percent point) of 10 ns and fall time of 20 ns.

PHYSICAL

Environment: 0° to +50°C operating, at 95% relative humidity (non-condensing)
−55° to +85°C storage

Power: 115/230 Vac ±10%, 47 to 440 Hz

Dimensions: 3.5″H × 19″W × 17″D chassis drilled for Jonathon 120 QD series chassis slides.

Weight: 23 lbs. (10.4 kg)

APPLICATIONS

- ☐ For use in applications requiring pulse distribution rates from 1 pps to 5M pps; digital signals or serial bit streams at TTL levels.
- ☐ Communications
- ☐ Timing systems
- ☐ Data acquisition
- ☐ Space and missle tracking
- ☐ Calibration laboratories

FEATURES

- ☐ Adjustable output
- ☐ 10 ns rise time
- ☐ Flexible input to output configuration
- ☐ Low propagation delay

Technical specifications subject to change without notice.

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MODEL 8526

PORTABLE TIME CODE GENERATOR

GENERAL

The Model 8526 Portable Time Code Generator is the result of over 10 years' experience in the manufacture and application of thousands of portable time code generators in operational aircraft, helicopters, ships, submarines, motor vehicles, hospitals and test sites. The units are supplied with a self-contained readout for display of days, hours, minutes and seconds. All operating controls and connectors are front panel mounted and packaging conforms to MS91403 (ATR). An optional internal battery provides 25 hours continuous operation. This portable time code generator can be synchronized to an external 1 PPS or WWV signal. As an option, the unit can be synchronized to an IRIG B input.

SPECIFICATIONS

CODE FORMAT:	IRIG B in terms of days, hours, minutes and seconds.
TIME BASE:	1 MHz crystal controlled oscillator with stability of 1 part in 10^5 within 0°C to +60°C and an aging rate of 1 part in 10^7/24 hrs.
OUTPUTS	
Modulated Code:	Adjustable 0 to 5 Vpp from a 35Ω, 15 mA source. Modulation ratio adjustable from 2:1 to 6:1.
DC Level Shift Code:	TTL compatible (2 loads).
Pulse Rates:	1 PPS, 10 PPS, 100 PPS and 1000 PPS with leading edge "on time."
MANUAL CONTROLS:	POWER ON/OFF toggle. MANUAL, AUTO, STOP, HOLD rotary switch. PRESET/RESET toggle. Thumbwheel PRESET switch.
PHYSICAL:	
Environment:	−20°C to +60°C at up to 95% relative humidity.
Shock vibration:	Mil E 5400, Class 1A
EMI:	Mil Std 461 and 462.
Power:	117 Vac, 48 to 440 Hz, or 20-32 Vdc.
Dimensions:	7½"H × 5"W × 12½"D (19.1 × 12.7 × 31.8 cm) Add 1½" to height for feet and carrying handle.
Weight:	Standard unit less than 9 lbs. (4.1 kg.)
Connectors:	Front panel multipin and BNC type.

(Specifications continued on page 2.)

FEATURES

- ☐ External synchronization to WWV or 1 PPS signal
- ☐ Lower power operation—25 hours using internal battery
- ☐ High efficiency LED display
- ☐ Many accessories and options
- ☐ AC/DC power operation standard
- ☐ Days, hours, minutes and seconds time display

SPECIFICATIONS 8526 Continued

DISPLAY: .43" high, red LED digits display days, hours, minutes and seconds.

SYNCHRONIZATION: Synchronizes with external pulse such as WWV.

OPTIONS:

- A11E: DC Level Shift Code, IRIG E
- A12B: Slow Code; days, hours, minutes and seconds (one of nine rates internally selectable).
- B14: Crystal oscillator: stability ± 5 parts in 10^7 within $-40°C$ to $+55°C$; aging rate 1 part in 10^8/week.
- C11: IRIG A Code, in lieu of IRIG B
- C26: XR3 (250 Hz) Code, in lieu of IRIG B
- C26A: XR3 (1 kHz) Code, in lieu of IRIG B
- C41: IRIG A/B Codes, switch selectable
- C48: IRIG H (100 Hz) Code in lieu of IRIG B
- C48A: IRIG H (1 kHz) Code in lieu of IRIG B
- E15: Parallel BCD outputs
- L14A: Battery pack, internal
- M13: Airborne package with shock mount
- S11: Advance/Retard Control
- S19A: IRIG B input synchronization

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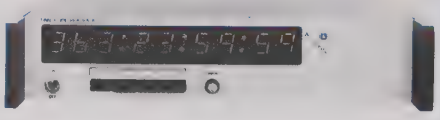
MODEL 8720



COMPACT TIME CODE GENERATOR

GENERAL

The Model 8720 is one of several instruments in the 8700 Series product line. The unit generates common serial time codes and displays the generated time in days, hours, minutes and seconds. A DC level shift code consisting of the envelope of the modulated serial code is also included. The time base is an internal crystal controlled oscillator. Alternately, an external 1 MHz signal may be used as a time base. Displays are .43" high LED digits available in high efficiency red or green (red is standard).

The Model 8720 uses state-of-the-art technology and can be powered by an optional internal battery, external 12 Vdc source, or 115/230 Vac.

SPECIFICATIONS

CODE OUTPUT FORMAT:	(Select one of the following): IRIG A, IRIG B, XR3 (250 Hz), XR3 (1 kHz) also called 2137 code, or NASA 36-bit.
CODE OUTPUT LEVEL:	Adjustable 0 to 5 Vpp from a 35Ω, 15 mA peak source. Modulation ratio adjustable from 2:1 to 6:1.
TIME BASE:	Crystal oscillator with stability of ±1 part in 10^5 within 0° to +60°C and an aging rate of ±1 part in 10^7 per day. Provision for 1 MHz external time base is also included.
PULSE RATE OUTPUTS:	1 PPS and carrier frequency repetition rate.
MANUAL CONTROLS:	ON/OFF, STOP, HOLD, REMOTE, RUN, PRESET/RESET switches.
PHYSICAL:	
Environment:	0° to +50°C at up to 95% relative humidity
Power:	115/230 Vac, 48 to 440 Hz or 12 Vdc.
Dimensions:	1¾"H × 8½"W × 12"D (4.44 × 21.6 × 30.5 cm) Panel, bench or rack mounting (please specify).
Weight:	Less than 8 lbs. (3.6 kg)
OPTIONS:	
A17A:	Coincident pulse and latched level outputs
D15:	Parallel BCD output with computer read command
E14:	Parallel BCD output, milliseconds
L14:	Internal battery pack

FEATURES

- ☐ Compact Size—1¾" panel height, 8½" width
- ☐ 115/230 Vac power and 12 Vdc operation
- ☐ Days, hours, minutes and seconds time display
- ☐ Remote control of RESET, STOP, HOLD and RUN functions

OPTIONAL FEATURES

- ☐ Internal battery pack
- ☐ Parallel BCD output with computer read command
- ☐ Coincident pulse and latched level outputs

8720/8730 GENERATOR/READER

The Model 8720 Time Code Generator and Model 8730 Time Code Reader can be supplied combined in a 1¾" high compact package suitable for 19" rack mounting. The advantages of this configuration over that previously available are:

- ☐ Simultaneous generate and read
- ☐ Independent displays for each function
- ☐ Generate and read codes are not necessarily the same
- ☐ Independent isolated outputs for each function

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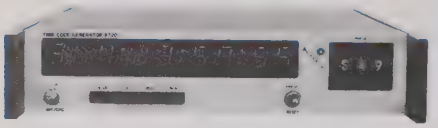
MODEL 8730



COMPACT TIME CODE READER

GENERAL

The Model 8730 Compact Time Code Reader is one of several new timing instruments in the Model 8700 Series product line. The unit accepts common modulated serial time codes in the forward or reverse directions and displays the decoded time information in days, hours, minutes and seconds. Displays are .43" high LED digits available in high efficiency red or green (red is standard).

The Model 8730 utilizes low power technology, and may be powered by an external 12 Vdc power source or 115/230 Vac.

SPECIFICATIONS

CODE INPUT FORMAT:	Select one of the following: IRIG A/B switch selectable or XR3 (250 Hz/1 kHz) switch selectable.
CODE INPUT LEVEL:	100 mV to 10 Vpp, greater than 100 kΩ input impedance.
PULSE RATE OUTPUTS:	Carrier frequency derived 1 PPS and carrier frequency square wave.
CARRIER FREQUENCY:	50 Hz to 250 kHz with modulation ratios from 2:1 to 6:1.
MANUAL CONTROLS:	ON/OFF switch and error bypass selection of 0,2,4 and 8 frames.
PHYSICAL:	
Environment:	0°C to +50°C at up to 95% relative humidity.
Power:	115/230 Vac, 48 to 440 Hz or 12 Vdc
Dimensions:	1¾"H × 8½"W × 12"D (4.44 × 21.6 × 30.4 cm) Panel, bench or rack mounting (please specify).
Weight:	Less than 10 lbs. (4.5 kg)
OPTIONS:	
A17A:	Coincident pulse and latched level inputs.
D15:	Parallel BCD output with computer read command.
E14:	Parallel BCD output, milliseconds.

FEATURES

- ☐ Compact size—1¾" panel height, 8½" width
- ☐ 115/230 Vac power and 12 Vdc operation
- ☐ Automatically senses direction
- ☐ Days, hours, minutes and seconds time display
- ☐ Digital filtering techniques utilized

OPTIONAL FEATURES

- ☐ Coincidence pulse and latched level outputs
- ☐ Parallel BCD output with computer read command

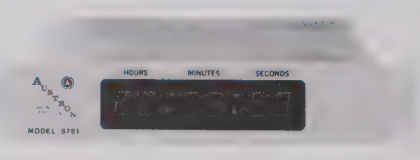
8720/8730 GENERATOR/READER

The Model 8720 Time Code Generator and Model 8730 Time Code Reader can be supplied combined in a 1¾" high compact package suitable for 19" rack mounting. The advantages of this configuration over that previously available are:

- ☐ Simultaneous generate and read
- ☐ Independent displays for each function
- ☐ Generate and read codes are not necessarily the same
- ☐ Independent isolated outputs for each function

AUSTRON INC.
a DATUM company
P.O. BOX 14766—EXIT 248, N IH35 AUSTIN, TX 78761•TELEPHONE (512) 251-2313•TWX 910/874-1356•FAX 512/251-9685

MODEL 8781



SERIAL REMOTE DISPLAY

GENERAL

Model 8781 Serial Remote Display decodes a modulated serial time code and presents the decoded time on .55" planar gas discharge displays. The display can be easily read at a distance of 25 feet.

Displays may be located over 1000 feet from the time code source and over 100 displays may be connected to one time code signal line. Each display has two BNC connectors on the rear panel. One BNC connector is the modulated serial code input and the other BNC can serve as an output to another Model 8781 Serial Remote Display.

The Model 8781 is particularly advantageous where time-of-day must be displayed at widely separated points and a single signal line can be run between displays instead of the 20 or more conductors required to transmit parallel BCD time information.

SPECIFICATIONS

CODE FORMAT: IRIG A, IRIG B, or XR3 modulated serial code input (select one code)

INPUT: .75 to 7.5 Vpp. Accepts modulated code in the forward direction from 80 Hz to 12 kHz with modulation ratios from 2:1 to 6:1. Input impedance is greater than 100 kΩ.

PHYSICAL:

Environment: 0°C to +50°C at up to 95% relative humidity.

Power: 115/230 V (±10%), 48 to 440 Hz. Power consumption less than 10 watts.

Dimensions: 1¾"H × 9½"W × 8"D (4.45 × 24.1 × 20.3 cm)

Weight: Less than 4 lbs. (1.8 kg)

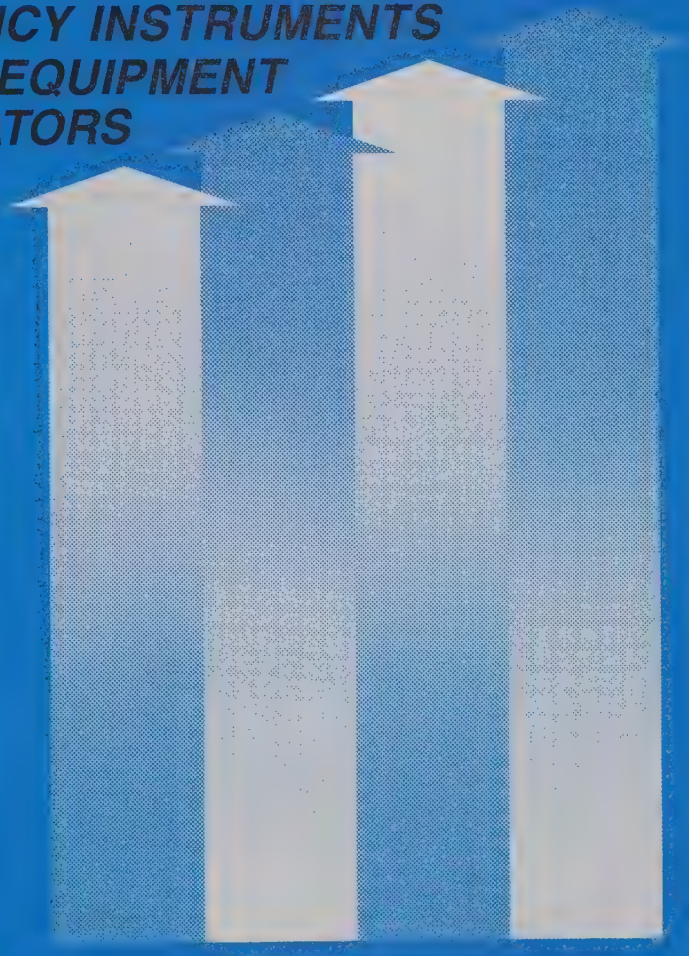
FEATURES

- ☐ Highly visible display—even in direct sunlight
- ☐ Compact size—1¾" panel height, 9½" width
- ☐ Convenient to use—a single signal line connects displays
- ☐ Economical—quantity discounts available
- ☐ Hours, minutes and seconds displayed

U.S. DOMESTIC

PRICE LIST
June 1989

INTEGRATED SYSTEMS
TIME & FREQUENCY INSTRUMENTS
TIME CODE EQUIPMENT
CRYSTAL OSCILLATORS



AUSTRON INC.
a DATUM company

TIME/FREQUENCY INSTRUMENTS

MODEL	DESCRIPTION	UNIT PRICE
1048	Converter, 50 to 60 Hz (for 1201A or 1201B Recorder Motor Only)	$ 860.00
1201B	Linear Phase Recorder, 60 Hz	$ 2,535.00
1201B	Linear Phase Recorder, 50/60 Hz	$ 3,125.00
1210D-( )	Portable Crystal Clock	$ 9,120.00
1250A	Crystal Frequency Standard	$ 6,600.00
1250B	Crystal Frequency Standard	$ 6,830.00
1270A	Alarm Panel	$ 1,820.00
1290A	Standby Power Supply	$ 4,630.00
1294	Pulse Distribution Chassis	See 1294 Price List
1295D	Distribution Chassis	See 1295D Price List
1324	DC/DC Converter (-24Vdc to +24Vdc)	$ 3,475.00
1324-1	DC/DC Converter (-48Vdc to +24Vdc)	$ 3,475.00
2000	Loran-C Receiver	$ 14,110.00
2010B	Disciplined Frequency Standard	$ 7,905.00
2021L	Loran-C Loop Antenna	$ 385.00
2026W	Loran-C Whip Antenna	$ 495.00
2055A	Phase Microstepper	$ 8,215.00
2080	VLF/LF Multicoupler (Unbalanced)	$ 3,295.00
2084	LF Multifilter	$ 4,290.00
2100	Loran-C Automatic Timing Receiver	$ 12,130.00
2100F	Loran-C Automatic Frequency Monitor	$ 7,540.00
2100R	Loran-C Automatic Frequency Reference	$ 6,945.00
OPTIONAL	IEEE-488 Bus Option for 2100, 2100F, or 2100R	$ 635.00
2110	Disciplined Frequency Standard	$ 10,575,00
2112	Disciplined Rubidium Frequency Standard	$ 13,880.00
OPTIONAL	IEEE-488 Bus Option for 2110 & 2112	$ 635.00
OPTIONAL	Dual Reference Input Option for 2110 & 2112	$ 1,435.00
OPTIONAL	Internal Battery Backup Option for 2110 & 2112	$ 330.00
OPTIONAL	100 kHz Sine Wave Output Option for 2110 & 2112	$ 1,105.00
2310	Disciplined Cesium Beam Frequency Standard	$ 40,425.00
Option 001	Stand-By Power Supply	$ 1,155.00
Option 002	Low Phase Noise Option	$ 3,695.00
Option 003	RS232 Interface	$ 665.00
Option 004	IEEE-488 Interface	$ 665.00
Option 005	Special Frequencies	On Request
6014	Frequency Multiplier	$ 5,265.00
6014B	Frequency Multiplier	$ 9,150.00
6016	Frequency Multiplier	$ 5,170.00

1294 PULSE DISTRIBUTION CHASSIS

PART NUMBER	DESCRIPTIONS		UNIT PRICE
	MAINFRAMES		
30411395	Mainframe With AC/DC Single Regulator		$ 2,265.00
30411395-1	Mainframe With DC-Only		$ 2,095.00
30411395-2	Mainframe With AC/DC Dual Regulator		$ 2,960.00
30411395-3	Mainframe With DC-Only, Dual Reglator		$ 2,795.00
	ADDITIONAL POWER/REGULATOR/ALARM MODULES FOR MAINFRAMES ABOVE		
23411346	Regulator Module		$ 700.00
23411350	AC/DC Power Input		$ 660.00
23411355	Dual DC Power Input		$ 550.00
10911487	Alarm Indicator Assembly		$ 1,215.00
10911487-1	Alarm Indicator Assembly for Dual Supply		$ 1,214.00
	INPUT MODULE ASSEMBLIES		
23411545-1	Quad Pulse Buffer W/Alarm, 50 Ohm Input		$ 720.00
23411545-2	Quad Pulse Buffer W/O Alarm, 50 Ohm Input		$ 720.00
23411545-3	Quad Pulse Buffer W/Alarm, High Impedence Input		$ 720.00
23411545-4	Quad Pulse Buffer W/O Alarm, High Impedence Input		$ 720.00
	OUTPUT MODULE ASSEMBLIES		
23411546-1	Quad Pulse Buffer, W/O Alarm	1-3	$ 665.00
23411546-2	Quad Pulse Buffer, W/Alarm	4-6	$ 600.00
		7-UP	$ 530.00
	VOTER SELECT MODULE ASSEMBLIES		
23411781-1	Voter Select X3 Pulse Rate	<1 PPS	$ 1,080.00
23411781-2	Voter Select X3 Pulse Rate	1 PPS	$ 1,080.00
23411781-3	Voter Select X3 Pulse Rate	10 PPS	$ 1,080.00
23411781-4	Voter Select X3 Pulse Rate	100 PPS	$ 1,080.00
23411781-5	Voter Select X3 Pulse Rate	150 PPS	$ 1,080.00
23411781-6	Voter Select X3 Pulse Rate	300 PPS	$ 1,080.00
23411781-7	Voter Select X3 Pulse Rate	600 PPS	$ 1,080.00
23411781-8	Voter Select X3 Pulse Rate	1KPPS	$ 1,080.00
23411781-9	Voter Select X3 Pulse Rate	1.2 KPPS	$ 1,080.00

1294 PULSE DISTRIBUTION CHASSIS

PART NUMBER	DESCRIPTIONS		UNIT PRICE
	VOTER SELECT MODULE ASSEMBLIES		
23411781-10	Voter Select X3 Pulse Rate	2 KPPS	$ 1,080.00
23411781-11	Voter Select X3 Pulse Rate	2.4 KPPS	$ 1,080.00
23411781-12	Voter Select X3 Pulse Rate	4.8 KPPS	$ 1,080.00
23411781-13	Voter Select X3 Pulse Rate	9.6 KPPS	$ 1,080.00
23411781-14	Voter Select X3 Pulse Rate	10 KPPS	$ 1,080.00
23411781-15	Voter Select X3 Pulse Rate	19.2 KPPS	$ 1,080.00
23411781-16	Voter Select X3 Pulse Rate	56 KPPS	$ 1,080.00
23411781-17	Voter Select X3 Pulse Rate	64 KPPS	$ 1,080.00
23411781-18	Voter Select X3 Pulse Rate	100 KPPS	$ 1,080.00
23411781-19	Voter Select X3 Pulse Rate	1 MPPS	$ 1,080.00
23411781-20	Voter Select X3 Pulse Rate	1.544 MPPS	$ 1,080.00
23411781-21	Voter Select X3 Pulse Rate	2.048 MPPS	$ 1,080.00
23411781-22	Voter Select X3 Pulse Rate	5 MPPS	$ 1,080.00
23411781-23	Voter Select X3 Pulse Rate	10 MPPS	$ 1,080.00

1295D DISTRIBUTION CHASSIS

PART NUMBER	DESCRIPTION		UNIT PRICE
	MAINFRAMES		
30411392	Mainframe With AC/DC Single Regulator		$ 2,265.00
30411392-1	Mainframe With DC-Only		$ 2,095.00
30411392-2	Mainframe With AC/DC Dual Regulator		$ 2,960.00
30411392-3	Mainframe With DC-Only, Dual Regulator		$ 2,795.00
	ADDITIONAL POWER/REGULATOR/ALARM MODULES FOR MAINFRAMES ABOVE		
23411342	Regulator Module		$ 700.00
23411350	AC/DC Power Input Module		$ 660.00
23411355	DC-Only Power Input Module		$ 550.00
10911487	Alarm Indicator Assembly		$ 1,215.00
10911487-1	Alarm Indicator Assembly for Dual Supply		$ 1,215.00
	OUTPUT MODULE ASSEMBLIES		
23499396	Quad Wideband Amplifier (100k-100 MHz) (BUS/BNC)	1-3	$ 665.00
23499396-1	Quad Wideband Amplifier (LO FREQ) (BUS/BNC)	4-6	$ 600.00
23499396-2	Quad Wideband Amplifier (BUS/TWX)	7-UP	$ 530.00
23499396-3	Quad Wideband Amplifier (BUS/TWX)		
23499396-4	Quad Wideband Amplifier (BUS/BNC)		
23499396-10	Quad Wideband Amplifier (BUS/WW)		
23499396-12	Quad Wideband Amplifier (BUS/WW)		
23499396-13	Quad Wideband Amplifier (BUS/WW)		
23410093	Quad Time Code Output (BUS/BNC)		
23410140	Quad RS422 Output (BUS/TWX)		
23410140-1	Quad RS422 Output (BUS/WW)		
23411085-1	Composite Clock Out (BUS/TWX)		
23411085-2	Composite Clock Out (BUS/WW)		
23411123	Quad V.35 Output (BUS/TWX)		
23411123-1	Quad V.35 Output (BUS/WW)		
23411589	Quad G.703 (BUS/TWX)		
23411589-1	Quad G.703 (BUS/WW)		
23411589-2	Quad G.703 (BUS/BNC)		
23411632	Quad TTL (BUS/BNC)		
23411560	Quad High Isolation/Low Noise (SMA/SMA)	1-3	$ 2,520.00
		4-6	$ 2,265.00
		7-UP	$ 2,005.00
	INPUT MODULE ASSEMBLIES		
23498935	Low Noise Wideband Input (BNC/BUS)		$ 535.00
23498935-1	Dual Low Noise Wideband Input (BNC/BUS)		$ 720.00
23499757	Time Code Input (BNC/BUS)		$ 1,080.00
23499757-1	Time Code Input Non AGC (BNC/BUS)		$ 720.00
23499880	10 dB Combiner (BNC/BNC)		$ 560.00
	CONVERTER/BUFFER MODULE ASSEMBLIES		
23410774-1	Converter/Buffer (BI-P/422) (BNC/BUS)		$ 720.00
23410774-2	Converter/Buffer (AMI/422) (TWX/BUS)		$ 720.00
23410774-3	Converter/Buffer (422/422) (TWX/TWX)		$ 720.00
23410774-4	Converter/Buffer (BI-P/BI-P) (BNC/BUS)		$ 720.00
23410774-5	Converter/Buffer (AMI/BI-P) (TWX/BUS)		$ 720.00
23410774-6	Converter/Buffer (422/BI-P) (TWX/BUS)		$ 720.00
23410774-7	Converter/Buffer (BI-P/AMI) (BNC/BUS)		$ 720.00
23410774-8	Converter/Buffer (AMI/AMI) (TWX/BUS)		$ 720.00
23410774-9	Converter/Buffer (422/AMI) (TWX/BUS)		$ 720.00

CONNECTOR CODES

BNC = BNC BUS = INTERNAL 1295D BUS TWX = TWIN BNC FO = FIBER OPTIC, SMA-TYPE WW = WIRE WRAP TTJ = BANTAM PHONE JACK

PART NUMBER	DESCRIPTION		UNIT PRICE
	SCALER/BUFFER MODULE ASSEMBLIES		
23498217	1/.1 MHz Scaler (BNC/BUS)		$ 720.00
23498441	5/5 & 1 MHz Scaler/Buffer (BNC/BUS)		$ 720.00
23498448	5/10 & 5 MHz Scaler/Buffer (BNC/BUS)		$ 720.00
23498612	1.544 MHz Buffer (BNC/BUS)		$ 720.00
23498619	5 & 1 MHz Dual Buffer (BNC/BUS)		$ 720.00
23498644	5/10 & 1 MHz Scaler/Buffer (BNC/BUS)		$ 720.00
23498661	10 & 1 MHz Dual Buffer (BNC/BUS)		$ 720.00
23498774	1 MHz Buffer (BNC/BUS)		$ 720.00
23498778	5 MHz Buffer (BNC/BUS)		$ 720.00
23498870	10 MHz Buffer (BNC/BUS)		$ 720.00
23498874	10/1 MHz Scaler (BNC/BUS)		$ 720.00
23498878	1 MHz/1 kHz Scaler (BNC/BUS)		$ 720.00
23498886	10/10 & 1 MHz Scaler (BNC/BUS)		$ 720.00
23410478	10/5 MHz Scaler (BNC/BUS)		$ 720.00
23411444	1 MHz/2 MHz Scaler (BNC/BUS)		$ 720.00
	GENERATOR/CLOCK RECOVERY MODULE ASSEMBLIES		
23410947	Composite Clock Generator (BUS) (BUS/BUS)		$ 1,080.00
23410947-1	Composite Clock Generator (BNC) (BNC/BUS)		$ 1,080.00
23410947-2	Composite Clock Generator (TWX) (TWX/BUS)		$ 1,080.00
23411072	Framed T1 Generator (TTJ/BUS)		$ 1,080.00
23411072-1	Framed T1 Generator (BNC/BUS)		$ 1,080.00
23411072-2	Framed T1 Generator (TWX/BUS)		$ 1,080.00
23411072-3	Framed T1 Generator (BUS/BUS)		$ 1,080.00
23411078	Clock Recovery (TTJ/BUS)		$ 1,080.00
23411078-1	Clock Recovery (TTJ/BNC)		$ 1,080.00
23411078-2	Clock Recovery (TTJ/I/O)		$ 1,080.00
23411078-3	Clock Recovery (TWX/BUS)		$ 1,080.00
23411078-4	Clock Recovery (TWX/TWX)		$ 1,080.00
23411078-5	Clock Recovery (TWX/BNC)		$ 1,080.00
23411078-6	Clock Recovery (BRIDGED BANTAMS)		$ 1,080.00
23411078-7	Clock Recovery (TWX/TWX)		$ 1,080.00
	AUTO SWITCHOVER MODULE ASSEMBLIES		
23410202	Auto Switchover (BNC/BNC)		$ 530.00
23410202-1	Auto Switchover Bus Out (BNC/BUS)		$ 530.00
23410202-2	Auto Switchover Bus I/O (BUS/BUS)		$ 530.00
23410202-3	Auto Switchover Bus In (BUS/BNC)		$ 530.00
23410202-4	Auto Switchover Balanced Line (TWX/TWX)		$ 530.00
23410202-5	Auto SW Balanced Bus I/O (BUS/BUS)		$ 530.00
23410202-6	Auto SW Balanced Bus Out (TWX/BUS)		$ 530.00
23410202-7	Auto SW Balanced Bus In (BUS/TWX)		$ 530.00
23410836	Auto Switchover/Remote Control (BNC/BNC)		$ 720.00
23410836-1	Auto SW Rmt Control Bus Out (BNC/BUS)	2 Slots	$ 720.00
23410836-2	Auto SW Rmt Control Bus I/O (BUS/BUS)	"	$ 720.00
23410836-3	Auto SW Rmt Control Bus In (BUS/BNC)	"	$ 720.00
23410836-4	Auto SW Rmt Control Bal Con (TWX/TWX)	"	$ 720.00
23410836-5	Auto SW Rmt Control Bal Bus I/O (BUS/BUS)	"	$ 720.00
23410836-6	Auto SW Rmt Control Bal Bus Out (TWX/BUS)	"	$ 720.00
23410836-7	Auto SW Rmt Control Bal Bus In (BUS/TWX)	"	$ 720.00
	SYNTHESIZER MODULE ASSEMBLIES		
23499035	Synthesizer	308kHz/1 MHz	(BNC/BUS) $ 1,080.00
23499401	Synthesizer	1 MHz/564 kHz	(BNC/BUS) $ 1,080.00
23499793	Synthesizer	128 kHz/5 MHz	(BNC/BUS) $ 1,080.00
23499871	Synthesizer	1/1.024 MHz	(BNC/BUS) $ 1,080.00
23410125	Synthesizer RS422	1/12.928 MHz	(BNC/BUS) $ 1,080.00
23410125-1	Synthesizer RS422	1/9.696 MHz	(BNC/BUS) $ 1,080.00
23410125-2	Synthesizer RS422	1/6.464 MHz	(BNC/BUS) $ 1,080.00
23410125-3	Synthesizer RS422	1/3.232 MHz	(BNC/BUS) $ 1,080.00
23410125-4	Synthesizer RS422	1/5 MHz	(BNC/BUS) $ 1,080.00
23410125-5	Synthesizer RS422	1/2.048 MHz	(BNC/BUS) $ 1,080.00
23410125-6	Synthesizer RS422	1/1.544 MHz	(BNC/BUS) $ 1,080.00
23410125-7	Synthesizer RS422	10/2.048 MHz	(BNC/BUS) $ 1,080.00
23410125-8	Synthesizer RS422	10/1.544 MHz	(BNC/BUS) $ 1,080.00
23410125-9	Synthesizer RS422	5/2.048 MHz	(BNC/BUS) $ 1,080.00
23410125-10	Synthesizer RS422	5/1.544 MHz	(BNC/BUS) $ 1,080.00
23410125-11	Synthesizer RS422	10/1.024 MHz	(BNC/BUS) $ 1,080.00
23410125-12	Synthesizer RS422	10/512 kHz	(BNC/BUS) $ 1,080.00
23410125-13	Synthesizer RS422	10/772 kHz	(BNC/BUS) $ 1,080.00
23410125-14	Synthesizer RS422	10/1.536 MHz	(BNC/BUS) $ 1,080.00
23410125-15	Synthesizer RS422	10/1.152 MHz	(BNC/BUS) $ 1,080.00
23410125-16	Synthesizer RS422	5 MHz/576 kHz	(BNC/BUS) $ 1,080.00
23410236	Synthesizer RS422	1/64 kHz	(BNC/BUS) $ 1,080.00
23410236-1	Synthesizer RS422	1/56 kHz	(BNC/BUS) $ 1,080.00
23410236-2	Synthesizer RS422	1/19.2 kHz	(BNC/BUS) $ 1,080.00

CONNECTOR CODES

BNC = BNC BUS = INTERNAL 1295D BUS TWX = TWIN BNC FO = FIBER OPTIC, SMA-TYPE WW = WIRE WRAP TTJ = BANTAM PHONE JACK

1295D DISTRIBUTION CHASSIS

PART NUMBER	DESCRIPTION			UNIT PRICE
23410236-3	Synthesizer RS422	1/16.8 kHz	(BNC/BUS)	$ 1,080.00
23410236-4	Synthesizer RS422	1/14.4 kHz	(BNC/BUS)	$ 1,080.00
23410236-5	Synthesizer RS422	1/9.6 kHz	(BNC/BUS)	$ 1,080.00
23410236-6	Synthesizer RS422	1/256 kHz	(BNC/BUS)	$ 1,080.00
23410236-7	Synthesizer RS422	1/4 kHz	(BNC/BUS)	$ 1,080.00
23410236-8	Synthesizer RS422	1/128 kHz	(BNC/BUS)	$ 1,080.00
23410236-9	Synthesizer RS422	1/4.8 kHz	(BNC/BUS)	$ 1,080.00
23410236-10	Synthesizer RS422	1/2.4 kHz	(BNC/BUS)	$ 1,080.00
23410236-11	Synthesizer RS422	1/1.2 kHz	(BNC/BUS)	$ 1,080.00
23410236-12	Synthesizer RS422	1/224 kHz	(BNC/BUS)	$ 1,080.00
23410236-13	Synthesizer RS422	1/280 kHz	(BNC/BUS)	$ 1,080.00
23410236-14	Synthesizer RS422	1 MHz/8 kHz	(BNC/BUS)	$ 1,080.00
23410432	Synthesizer	56 kHz/1 MHz	(BNC/BUS)	$ 1,080.00
23410432-1	Synthesizer	56 kHz/5 MHz	(BNC/BUS)	$ 1,080.00
23410434	Synthesizer	1.544/1 MHz	(BNC/BUS)	$ 1,080.00
23410434-1	Synthesizer	1.544/5 MHz	(BNC/BUS)	$ 1,080.00
23410796	Synthesizer RS422	5/56 kHz	(BNC/BUS)	$ 1,080.00
23410796-1	Synthesizer RS422	5/8 kHz	(BNC/BUS)	$ 1,080.00
23410796-2	Synthesizer RS422	5/60 kHz	(BNC/BUS)	$ 1,080.00
23410812	Synthesizer	8 kHz/5 MHz	(BNC/BUS)	$ 1,080.00
23411037	Synthesizer RS422	10/64 kHz	(BNC/BUS)	$ 1,080.00
23411037-1	Synthesizer RS422	10/56 kHz	(BNC/BUS)	$ 1,080.00
23411037-2	Synthesizer RS422	10/256 kHz	(BNC/BUS)	$ 1,080.00
23411037-3	Synthesizer RS422	10/9.6 kHz	(BNC/BUS)	$ 1,080.00
23411037-4	Synthesizer RS422	10/224 kHz	(BNC/BUS)	$ 1,080.00
23411037-5	Synthesizer RS422	10/280 kHz	(BNC/BUS)	$ 1,080.00
23411106	Synthesizer T2	6.312 MHz	(BNC/BUS)	$ 1,080.00
23411321	Synthesizer	10 MHz/768 kHz	(BNC/BUS)	$ 1,080.00
23411322	Synthesizer	1 MHz/308 kHz	(BNC/BUS)	$ 1,080.00
23411644	Synthesizer	10 MHz/64 kHz	(BNC/TWX)	$ 1,080.00
23411644-1	Synthesizer	10 MHz/56 kHz	(BNC/TWX)	$ 1,080.00
23411644-2	Synthesizer	10 MHz/256 kHz	(BNC/TWX)	$ 1,080.00
23411644-3	Synthesizer	10 MHz/9.6 kHz	(BNC/TWX)	$ 1,080.00
23411644-4	Synthesizer	10 MHz/224 kHz	(BNC/TWX)	$ 1,080.00
23411644-5	Synthesizer	10 MHz/280 kHz	(BNC/TWX)	$ 1,080.00
23411645	Synthesizer RS422	10/248 kHz	(BNC/TWX)	$ 1,080.00
23411645-1	Synthesizer RS422	10/1.544 MHz	(BNC/TWX)	$ 1,080.00
23411833	Synthesizer	2.048/1 MHz	(BNC/BUS)	$ 1,080.00
23411833-1	Synthesizer	2.048/5 MHz	(BNC/BUS)	$ 1,080.00
23411834	Synthesizer	60kHz/1 MHz	(BNC/BUS)	$ 1,080.00
23411834-1	Synthesizer	60kHz/5 MHz	(BNC/BUS)	$ 1,080.00
23411872	Synthesizer Framed T1		(BNC/BUS)	$ 1,080.00
23411872-1	Synthesizer Framed T1		(BUS/BUS)	$ 1,080.00

VOTER SELECT MODULE ASSEMBLIES

PART NUMBER	DESCRIPTION			UNIT PRICE
23411497	Remote Control			$ 685.00
23411779-1	Voter Select X3	100 Hz	50 Ohm Input Z	$ 1,080.00
23411779-2	Voter Select X3	250 kHz	50 Ohm Input Z	$ 1,080.00
23411779-3	Voter Select X3	1 kHz	50 Ohm Input Z	$ 1,080.00
23411779-4	Voter Select X3	1.5625 kHz	50 Ohm Input Z	$ 1,080.00
23411779-5	Voter Select X3	2 kHz	50 Ohm Input Z	$ 1,080.00
23411779-6	Voter Select X3	3.125 kHz	50 Ohm Input Z	$ 1,080.00
23411779-7	Voter Select X3	6.25 kHz	50 Ohm Input Z	$ 1,080.00
23411779-8	Voter Select X3	10 kHz	50 Ohm Input Z	$ 1,080.00
23411779-9	Voter Select X3	12.5 kHz	50 Ohm Input Z	$ 1,080.00
23411779-10	Voter Select X3	25 kHz	50 Ohm Input Z	$ 1,080.00
23411779-11	Voter Select X3	50 kHz	50 Ohm Input Z	$ 1,080.00
23411779-12	Voter Select X3	56 kHz	50 Ohm Input Z	$ 1,080.00
23411779-13	Voter Select X3	64 kHz	50 Ohm Input Z	$ 1,080.00
23411779-14	Voter Select X3	100 kHz	50 Ohm Input Z	$ 1,080.00
23411779-15	Voter Select X3	200 kHz	50 Ohm Input Z	$ 1,080.00
23411779-16	Voter Select X3	308 kHz	50 Ohm Input Z	$ 1,080.00
23411779-17	Voter Select X3	1 MHz	50 Ohm Input Z	$ 1,080.00
23411779-51	Voter Select X3	100 Hz	1000 Ohm Input Z	$ 1,080.00
23411779-52	Voter Select X3	250 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-53	Voter Select X3	1 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-54	Voter Select X3	1/5625 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-55	Voter Select X3	2 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-56	Voter Select X3	3.125 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-57	Voter Select X3	6.25 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-58	Voter Select X3	10 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-59	Voter Select X3	12.5 kHz	1000 Ohm Input Z	$ 1,080.00
23411779-60	Voter Select X3	25 kHz	1000 Ohm Input Z	$ 1,080.00

CONNECTOR CODES

BNC = BNC BUS = INTERNAL 1295D BUS TWX = TWIN BNC FO = FIBER OPTIC, SMA-TYPE WW = WIRE WRAP TTJ = BANTAM PHONE JACK

VOTER SELECT MODULE ASSEMBLIES

PART NUMBER	DESCRIPTION				UNIT PRICE
23411779-61	Voter Select X3	50	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-62	Voter Select X3	56	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-63	Voter Select X3	64	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-64	Voter Select X3	100	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-65	Voter Select X3	200	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-66	Voter Select X3	308	kHz	1000 Ohm Input Z	$ 1,080.00
23411779-67	Voter Select X3	1	MHz	1000 Ohm Input Z	$ 1,080.00
23411780-1	Voter Select X3	1	MHz	Analog SW.	$ 1,080.00
23411780-2	Voter Select X3	1.544	MHz	Analog SW.	$ 1,080.00
23411780-3	Voter Select X3	2.048	MHz	Analog SW.	$ 1,080.00
23411780-4	Voter Select X3	5	MHz	Analog SW.	$ 1,080.00
23411780-5	Voter Select X3	10	MHz	Analog SW.	$ 1,080.00
	OSCILLATOR/PHASE LOCKED LOOP MODULE ASSEMBLIES				
23411419	Rubidium Oscillator (BUS or BNC Output)			3 Slots	$ 5,290.00
23411532	10 MHz Digital Hold PLL (BUS or BNC Output)			"	$ 2,645.00
23411532-1	5 MHz Digital Hold PLL (BUS or BNC Output)			"	$ 2,645.00
23411532-2	6.312 MHz Digital Hold PLL (BUS or BNC Output)			"	$ 2,645.00
23411549	Rubidium PLL (BUS or BNC Output)			4 Slots	$ 5,735.00
23411619	1.544 MHz 1121 PLL (BUS or BNC Output)			3 Slots	$ 2,995.00
23411619-1	2.048 MHz 1121 PLL (BUS or BNC Output)			"	$ 2,995.00
	FIBER OPTIC MODULE ASSEMBLIES				
23411259	Digital Fiber Optic Transmitter, (BUS/FO)				$ 1,080.00
23411259-1	Digital Fiber Optic Transmitter, (BNC/FO)				$ 1,080.00
23411261	Digital Fiber Optic Receiver, (FO/BUS)				$ 1,080.00
23411261-1	Digital Fiber Optic Receiver, (FO/BNC)				$ 1,080.00
23411604	Analog Fiber Optic Transmitter, (BUS/FO)				$ 1,080.00
23411604-1	Analog Fiber Optic Receiver, (FO/BUS)				$ 1,080.00
	FILTER MODULE ASSEMBLIES				
23410127	Filter 564 kHz (BUS/BUS)				$ 535.00
23410127-1	Filter 308 kHz (BUS/BUS)				$ 535.00
23410127-2	Filter 2048 kHz (BUS/BUS)				$ 535.00
23410127-3	Filter 60 kHz (BUS/BUS)				$ 535.00

TIME/CODE INSTRUMENTS

MODEL	DESCRIPTION	UNIT PRICE
	5000 SERIES	
5191	Tone Generator	$ 3,200.00
5281	Remote Display, D/H/M/S UP/DN .43" Digit	$ 1,195.00
5282	Remote Display, Total Seconds UP/DN .43" Digit	$ 1,195.00
5483	Remote Display, D/H/M/S and Total Seconds UP/DN .43" Digit	$ 2,270.00
5581	Remote Display, D/H/M/S UP/DN 2" Digit	$ 2,770.00
5582	Remote Display, Total Seconds UP/DN 2" Digit	$ 2,705.00
	8100 SERIES	
8110	Digital Clock	$ 2,695.00
8120	Time Code Generator	$ 3,340.00
8132	Time Code Reader	$ 3,835.00
8134	Time Code Reader/Tape Search Unit	$ 6,235.00
8152	Time Code Generator/Reader	$ 4,530.00
8154	Time Code Generator/Reader/Tape Search	$ 7,945.00
8155	Synchronized Time Code Generator	$ 5,245.00
8180	Remote Display, H/M/S 1" Digit	$ 1,780.00
8181	Remote Display, H/M/S 1" Digit	$ 1,580.00
8190A	Pulse Distribution Amplifier	$ 2,015.00
10308672	Quad Input Buffer for 8190A	$ 630.00
10308673	Quad Output Buffer for 8190A	$ 630.00
	OPTIONS FOR 8100 SERIES	
A12A	Type A Slow Code (H/M/S)	Note: Prices Available Upon Request
A12B	Type B Slow Code (D/H/M/S)	
A15	Buffers, Input/Output, H/M/S for Model 8180	
A15A	Buffers, Input/Output, D/H/M/S for Model 8180	
A16	Control Bit Insertion (45 Bits)	
A16C	Control Bit Translation (45 Bits)	
A16D	Control Bit Translation & Display	
A17	Coincidence Out, 6 Digit, H/M/S	
A17B	Coincidence Out, 9 Digit, D/H/M/S	
A17C	Coincidence Out, 12 Digit, D/H/M/S/Millisec	
A21	Computer Read Command	
B11	Oscillator, Crystal (Except Model 8154)	
B12	Oscillator, Crystal (8110)	

CONNECTOR CODES

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MODEL	DESCRIPTION	UNIT PRICE
B13	Oscillator, Crystal (Except Model 8154)	
B14	Oscillator, Zero Warm-up	
B17	Flywheel Oscillator	
C11	IRIG A/10 kHz in Lieu of IRIG B	
C11Q	IRIG A Output Code for Model 8155	
C12A	IRIG B/17-Bit Binary Seconds	
C12B	Parallel Binary Seconds Out	
C12Q	IRIG B Output Code for Model 8155	
C17	NASA 28-Bit Code in Lieu of IRIG B	
C17Q	NASA 28-Bit Output Code for Model 8155	
C18	NASA 36-Bit Code in Lieu of IRIG B	
C18Q	NASA 36-Bit Output Code for Model 8155	
C26	XR3 250 Hz Code in Lieu of IRIG B	
C26A	XR3 1 kHz Code in Lieu of IRIG B	
C26P	XR3 1 kHz Output Code for Model 8155	
C26Q	XR3 250 Hz Output Code for Model 8155	
C41	Switch Selectable IRIG A/B Codes	
C47	Switch Selectable XR3 250 Hz/1 kHz Codes	
C48	IRIG H 100 Hz Code in Lieu of IRIG B	
C48A	IRIG H 1 kHz Code in Lieu of IRIG B	
C48P	IRIG H 1 kHz Output Code for Model 8155	
C48Q	IRIG H 100 Hz Output Code for Model 8155	
C49	Universal IRIG Codes	
C50	WWVB Code in Lieu of IRIG B for Model 8155 Input	
D11	Parallel BCD Output H/M/S (For Model 8181)	
D11D	Parallel BCD Output D/H/M/S (For Model 8181)	
D14-X	20-Bit Buffer Register	
D15	BCD Outputs, H/M/S	
D15A	BCD Outputs, Days/ID	
	IEEE-488 INTERFACE, TIME ON DEMAND	
D20	Hr, Min, Sec	Note: Prices
D21	Hr, Min, Sec, & Millisec	Available
D22	Day, Hr, Min, & Sec	Upon
D23	Day, Hr, Min, Sec, & Millisec	Request
	RS232 INTERFACE, TIME ON DEMAND	
D30	Hr, Min, & Sec	
D31	Hr, Min, Sec, & Millisec	
D32	Day, Hr, Min, & Sec	
D33	Day, Hr, Min, Sec, & Millisec	
E13	Days/ID Number	
E14	Parallel BCD Output - Millisec	
E14A	Parallel BCD Output - Millisec for Model 8134 & Model 8154	
E14	Search to Millisec For Model 8134 & Model 8154	
E16	Remote Tape Speed Select	
E17	Simultaneous Generate/Read, 6-Digit	
E17A	Simultaneous Generate/Read, 9-Digit	
E19	Search for TOD/DOY/Both (Must Have Opt E13)	
E20	Days for Model 8155	
E22	Generate Preset for Model 8155 (H/M/S)	
E22A	Generate Preset for Model 8155 (D/H/M/S)	
E25	Calendar Clock for Model 8110	
	COMPUTER INTERFACE, SEARCH (SPECIFY COMPUTER I/O ARRANGEMENT)	
FC6H	Hr, Min, & Sec	
FC9H	Hr, Min, Sec, & Millisec	
FC9D	Day, Hr, Min & Sec	
FC12D	Day, Hr, Min, Sec & Millisec	
	IEEE-488 INTERFACE, SEARCH	
FE6H	Hr, Min, & Sec	
FE9H	Hr, Min, Sec, & Millisec	
FE9D	Day, Hr, Min, & Sec	
FE12D	Day, Hr, Min, Sec, & Millisec	
L13	20-50 Vdc Power	
M16	Ceiling/Wall Mount for Model 8180 & Model 8181	
S11	EXT Synchronization	
S11A	WWV SYNC, W/Prop Delay	
S12	Propagation Delay for Model 8155	
S13	Analog Filter, Manual	
S14	Analog Filter, Remote	
	ACCESSORIES FOR 8100 SERIES	
8198-4	Battery Pack, 4 Amp Hrs	$ 2,500.00
8198-0401	Battery Pack	$ 2,640.00
8198-8	Battery Pack, 8 Amp Hrs	$ 3,110.00

TIME/CODE INSTRUMENTS

MODEL	DESCRIPTION	UNIT PRICE
8198-12	Battery Pack, 12 Amp Hrs	$ 3,700.00
11400453	Chassis Slides	$ 170.00
11008613-( )	Mounting Plate	$ 200.00
	8500 SERIES	
8526	Portable Time Code Generator	$ 5,520.00
	OPTIONS FOR 8526 SERIES	
A11E	IRIG E DC Code Output	Note: Prices
A12B	Type B Slow Code, One Rate	Available
B14	Oscillator, Zero Warm-up	Upon
C11	IRIG A in Lieu of IRIG B	Request
C26	XR3/250 Hz in Lieu of IRIG B	
C26A	XR3/1 kHz in Lieu of IRIG B	
C41	IRIG A/IRIG B Sw. Select	
C48	IRIG H 100 Hz in Lieu of IRIG B	
C48A	IRIG H 1 kHz in Lieu of IRIG B	
E14	Parallel BCD Output, Millisec	
E15	Parallel BCD Output, D/H/M/S	
L14A	Internal Battery	
L14B	Dual Internal Battery	
M13	Airborne Package	
S11	Advance Retard Control	
S19A	IRIG B Synchronize	
	8700 SERIES (SPECIFY TIME CODE AND MOUNTING ARRANGEMENT)	
8720	Compact Time Code Generator	$ 2,300.00
8730	Compact Time Code Reader	$ 2,300.00
8720/8730	Time Code Generator/Reader	$ 4,370.00
8781	Serial Remote Display	$ 1,045.00
	OPTIONS AND ACCESSORIES FOR 8700 SERIES	
A17	Coincident Outputs	
D15	Parallel BCD Output, D/H/M/S	
E14	Parallel BCD Output, Millisec	
L14	Internal Battery Pack for Model 8720	

HIGH STABILITY CRYSTAL OSCILLATORS

MODEL	DESCRIPTION	UNIT PRICE
1100-5	1 MHz or 5 MHz Compact 5 X 10^{-9} Aging	$ 740.00
1100-2	1 MHz or 5 MHz Compact 2 X 10^{-9} Aging	$ 790.00
1100-1	1 MHz or 5 MHz Compact 1 X 10^{-9} Aging	$ 865.00
1105-5	1 MHz TTL Logic Output 5 X 10^{-9} Aging	$ 740.00
1105-2	1 MHz TTL Logic Output 2 X 10^{-9} Aging	$ 790.00
1105-1	1 MHz TTL Logic Output 1 X 10^{-9} Aging	$ 865.00
1111	10 MHz, Compact, Low Phase Noise, Fast Warm-up	$ 1,655.00
1115	5 MHz Minimal Power Drain	$ 945.00
1120-5	1, 5, or 10 MHz Versatile 5 X 10^{-9} Aging	$ 740.00
1120-2	1, 5, or 10 MHz Versatile 2 X 10^{-9} Aging	$ 790.00
1120-1	1, 5, or 10 MHz Versatile 1 X 10^{-9} Aging	$ 865.00
1120FW	5 MHz Fast Warm-up 5 X 10^{-9} Aging	$ 925.00
1120L	5 MHz or 10 MHz Low Phase Noise	$ 1,210.00
1120PLL	5 MHz Phase Lock Loop	$ 925.00
1120PLL	5 MHz Phase Lock Loop High Rel/Low Noise, (P/N 30298811-2)	$ 2,700.00
1150	5 MHz High Stability Crystal Oscillator	$ 2,720.00
1151	10 MHz High Stability Crystal Oscillator	$ 1,390.00
1180	5 MHz Maximum Stability Crystal Oscillator	$ 3,675.00
	NOTE: These prices are for Austron standard frequency oscillators (1, 5 or 10 MHz) manufactured to Austron standard part number specifications. For any nonstandard frequency, wiring, size, environmental or testing requirements, contact Product Marketing Manager for pricing.	

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